THE PAPER INDUSTRY and PAPER WORLD

DECEMBER, 1940 — VOLUME 22 — NUMBER 9

—FEATURES—

Deinking of Waste Papers.....Roderick O'Donoghue 911
Responsibility of a Foreman in a Plant Safety Program.V. C. Gault 917
Brown Mechanical Pulp from Yellow Birch—Part II.....
.....Myron Kin and C. E. Libby 918
The Paper Dollar.....Arthur B. Green 924
Convention Papers . . . Abridged 944

—NEWS—

Trade Winds 881
Associations 928
Allied 930
Safety 934
Other Countries .....
Names in the News..... 936
Personals 936
Necrology 942

—DEPARTMENTS—

Theme Page 880
Editorials 899
Current Thought..... 900
Coming Events 926
Paper Sketches 927
Safety Contest Scores..... 934
New Equipment and Supplies 976
Technical Developments 980
Papermaking Patents 982
New Publications 984
Current Market Quotations.. 986
Index to Advertisers..... 989

Eastern Representative: L. D. Schnabel, 9 Rockefeller Plaza, New York, N. Y. Pacific Coast Representative: Norman C. Nourse, 1031 S. Broadway, Los Angeles, Calif. Entered as second class matter June 29, 1938, at the post office at Chicago, Ill., under the Act of March 3, 1879. Subscriptions in the United States, U. S. Possessions, Cuba and Mexico, $2.00 for one year or $3.00 for two years; Canada, $2.50 for one year, or $3.50 for two years. All other countries, $3.00 for one year, or $5.00 for two years.

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THE PAPER INDUSTRY and PAPER WORLD is indexed regularly in *The Industrial Arts Index*. An index to each volume is issued annually by the Publisher as Section Two of the April number.

Member: Audit Bureau of Circulations and the Associated Business Papers, Inc. Published Monthly by

FRITZ PUBLICATIONS, INC., 59 East Van Buren Street, Chicago, Ill.

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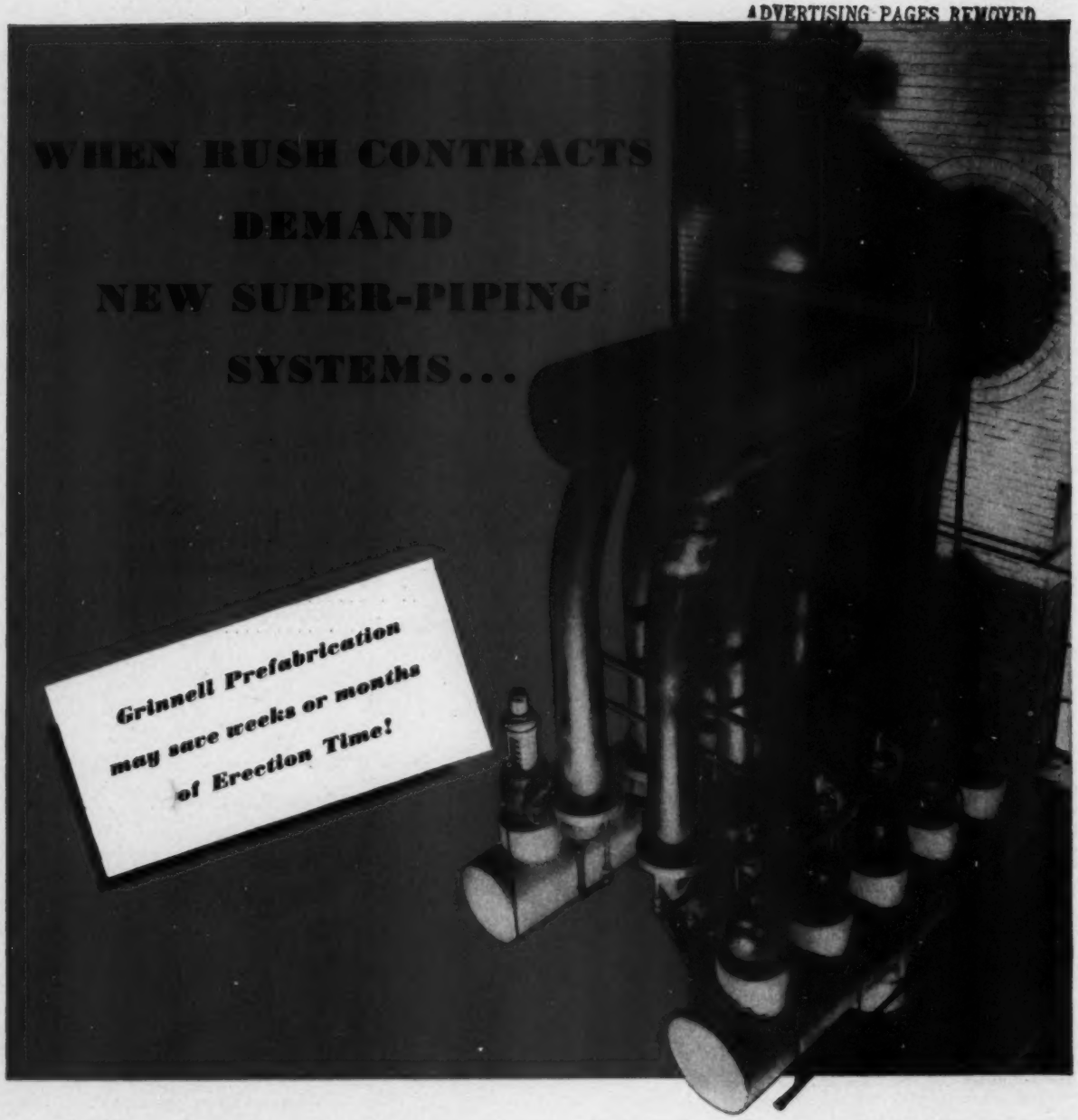

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PREFABRICATION BY **GRINNELL**

WHENEVER **PIPING** IS INVOLVED

PAPER INDUSTRY ACTIVITY

▸▸▸ ACTIVITY in the paper industry steadied down to normal this fall, after the stimulation of sudden peaks in demand consequent to developments in the European war.

Production, which held at record levels for the first nine months of the year, has declined below the level of last autumn, when operations were influenced by a surge of forward buying due to the outbreak of war. Output remains above 80 per cent of capacity, however.

Distributors report the underlying trend to be upward in consumer demand. Orders show a slow seasonal rise, although they continue to lag behind the high level of last autumn, reflecting a return to normal purchasing policies.

Profits of the industry, as indicated by published earnings statements of individual companies, more than doubled in the first nine months of 1940, compared with the like 1939 period. Shipments improved in volume, and to an even greater extent in value. Expanded demand from domestic sources, the result of better general business conditions, was supplemented by sharply increased purchases from foreign markets cut off from European sources of supply.

Prices of finished products have held at the high for the year, after upward revisions necessitated by the rise in quotations on wood pulp, largest single raw material expense of the industry. Producers report that the upward adjustments in prices of many finished products do not yet compensate completely for the sharp jump in raw material quotations.

Uncertainties in the world situation continue to influence inventories. Heavier stocks of finished goods prevail generally throughout the trade, but in view of the larger sales volume trade authorities do not consider them excessive.

Nine Months' Output at Peak

Mirroring the enlarged demand from all markets, a continuous high rate of production lifted tonnage output of paper, including newsprint and paperboard, to a new high for the period in the first nine months of 1940. The record 8,523,920 tons exceeded the previous peak in 1937 by 5 per cent, and was 10 per cent above 1939.

The large backlogs accumulated from the rush of orders at the outbreak of war were worked off by the end of the first quarter. A renewed wave of anticipatory buying and the appearance of large foreign orders followed the loss of access to Scandinavian pulp supplies. Liquidation of these orders kept mills unusually active this summer.

Normal conditions again prevailed by September, however, and output recently has been tuned more closely to the usual demands of the trade. Manufacturers of paper, excluding newsprint and paperboard, operated at 83 per cent of capacity in September, against 89 per cent in September, 1939, and 87 per cent in August. (American Paper and Pulp Association.)

The National Paperboard Association reported operations in that division at 72 per cent of capacity in September, compared with 74 per cent last year and in August. Responding to a usual seasonal expansion, rates increased to 89 per cent in the paper industry, and 80 per cent in paperboard group by the end of October.

Newsprint production in Canada and the United States, according to the News Print Service Bureau, dipped below the August total in September but remained 9 per cent ahead of 1939. Year-to-year increases for the first nine months of 1940 averaged 21 per cent over last year.

Broad Increase in Demand

Distributors of paper and its products experienced a 10 per cent gain in sales during the first eight months of this year, as compared with 1939 (U. S. Bureau of the Census). Newsprint consumption for the same period increased 6 per cent. September figures, as reported by the News Print Service Bureau, revealed that newsprint consumption in that month kept pace with last year.

Sales to foreign buyers more than doubled in the first nine months of 1940. The upward surge in demand, accelerated after the isolation of Scandinavia, carried total exports of paper and manufactures to $50,600,000, compared with $21,300,000 in 1939.

EDITOR'S NOTE: This article was prepared by Dun & Bradstreet, Inc., from results of a recent survey of the industry.

Wood Pulp Prices Climb

The combination of enlarged demand and the cessation of supplies from European sources caused prices of wood pulp to move directly upward throughout the year. By September quotations on sulphite, sulphate and mechanical pulps had gained about 60 per cent over the level of September, 1939, and prices held firm at the high.

Pulp shortages feared by the trade had not materialized by the end of October, and stocks, although smaller, were generally considered adequate at current production levels. Restricted supply situations were reported in special cases, notably unbleached sulphite, the only type of pulp for which domestic consumption is not covered by our capacity to produce. In 1939 about 40 per cent of our requirements came from Scandinavia.

Total supplies of wood pulp during the first nine months of this year exceeded the amount available in the same period of 1939, due to an expansion of 44 per cent in domestic wood pulp production and a 60 per cent rise in imports from Canada. Heavier shipments from the Scandinavian companies prior to invasion also swelled total stocks; since April, however, arrivals from these countries have been negligible.

Heavier drains against available supplies of pulp by domestic mills in 1940

were accentuated by the tremendous climb in sales for export. These reached a cumulative total of 371,428 tons at the end of September, almost four times the volume shipped in the first three quarters of 1939.

Fewer Failures

Prosperous conditions resulted in fewer financial difficulties for the paper industry. For the period January through September, the average number of failures per month was the lowest since 1937.

Wholesalers and retailers reduced bankruptcies to 15 for the period, a decrease of 5 from the 1939 total. Three manufacturers failed this year, as against two last year. Liabilities reported were heavier this year than last in both groups, and amounted to $392,000, compared with $250,000 in 1939.

The failure record of the trade since 1927 is given below. Beginning with 1939, figures include all cases involving loss to creditors; prior to that year only cases involving court actions were reported.

Manufacturers

Year	Number	Liabilities
1927	9	$2,189,000
1928	7	878,000
1929	10	1,929,000
1930	4	1,371,000
1931	11	2,794,000
1932	9	2,577,000
1933	11	2,263,000
1934	11	2,694,000
1935	12	6,800,000
1936	9	4,344,000
1937	7	2,878,000
1938	7	1,511,000
1939	5	103,000
1940*	3	149,000

Wholesalers and Retailers

Year	Number	Liabilities
1927	20	$1,131,000
1928	24	571,000
1929	17	268,000
1930	14	210,000
1931	26	516,000
1932	33	936,000
1933	17	524,000
1934	16	333,000
1935	20	247,000
1936	11	104,000
1937	11	188,000
1938	29	644,000
1939	26	283,000
1940*	15	243,000

(*) January to September, inclusive.

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▶▶▶ RAYONIER, INC., has announced that there will be no increase in its dissolving and paper pulp prices for the first quarter of 1941.

MILK IN PAPER BOTTLES AFTER LONG COURT FIGHT

After a legal battle of several years involving various decisions and injunctions a district court of the United States gave dairies in the City of Chicago the right to sell milk in paper containers.

Although a great number of cities now sell the milk in containers made of paper and have been doing so for quite some time it had been, until recently, impossible to follow suit in Chicago because of some objections raised as to the law governing the use of paper as containers for milk.

Federal Judge Charles E. Woodward, in both the court memorandum and official decree declared that paper containers were safe and sanitary and pointed out that 480 cities are using paper containers in addition to six of the largest cities. He also pointed out that where the paper containers had been used no epidemics and no health hazard had been reported.

The Dean Milk Company, using Pure-Pak containers, has been selling their milk in Chicago suburbs but until the court ruling had not been permitted to sell in Chicago.

Other milk companies in Chicago are also selling milk and cream in paper containers. In order to meet the new demand from Chicago and other sources the Sutherland Paper Company, Kalamazoo, Michigan, will soon operate a paper milk bottle manufacturing plant, it was reported. Four machines have been purchased for this purpose and will be installed in a new $50,000 plant now under construction in Kalamazoo. The Sutherland company has already received one large order for 20 carloads of paper milk bottles, to be delivered in Chicago within six months.

◆

SORG PAPER CO. HAS CONTRACT WITH VANCOUVER

The Sorg Paper Company, Middletown, Ohio, has entered into a two-year contract with the Vancouver Kraft Corporation to purchase the entire production of the Port Mellon mill, located twenty-five miles north of Vancouver, British Columbia.

The contract includes an option to buy the Port Mellon mill together with the sawmill connected with it at any time during the two-year period. This mill has an immediate capacity of 20,000 tons per year and is designed for an ultimate maximum capacity of 40,000 tons per year. For the time being the mill will operate at the 20,000 ton rate.

By this recently-announced contract the Sorg Paper Company is assured of an ample supply of best quality, northern unbleached kraft pulp for conversion into various types of high grade kraft papers.

◆

FOX RIVER'S IDLE RAVINE MILL RE-OPENED

On the second anniversary of the acquirement of the Fox River Paper Corporation by the Oberweiser interests, the Ravine mill, fourth unit of the company, was reopened on December 1 employing seventy men. The mill has been down since April, 1938, but has been kept in condition for immediate operation. The decision to re-open is based on the high level of government buying and the belief that commercial business will improve rapidly. The mill's capacity is 7,700,000 pounds of rag content paper annually. Several improvements are contemplated.

◆

NEWFOUNDLAND NEWSPRINT SALES SHOW SHARP RISE

Newfoundland's newsprint sales have risen sharply, recent reports have indicated. The island's shipments up to October are up a third over the 1939 period, shipments in the first ten months of 1940 being 312,763 tons. This is more than was shipped in all of 1938 and 1939 and is above the 222,615 tons shipped in the first ten months of 1939 by far.

Normally the United Kingdom is the principal market for the island's newsprint and difficulties created by war conditions have had their influence on trade. The volume of shipments to the United Kingdom, contrary to expectations, has amounted to 179,587 tons from January 1, 1940, to October 31 of the same year. This represents an increase of more than 23,000 tons over last year but the percentage of shipments to the United Kingdom in relation to total shipments dropped to 57.5 per cent as compared to 69.4 per cent last year.

Undoubtedly this year's trade with the United States is the prime reason for Newfoundland's increase in newsprint sales. At the end of October, this year, shipments total 132,601 tons as against 67,930 tons over a like period in 1939. Present indications are that shipments to the United States will be the largest ever reported.

"Please get out of my bathtub,"

said the man on page 27 to the Gnu from page 28

"I'D like to," the Gnu replied, "because I really belong on the next page with that animal article. I've just 'shown through'; that's all."

"Then please go back," said the man testily.

"I can't go back," said the Gnu, settling himself more comfortably. "Why don't you speak to the paper manufacturer?"

"About using Krebs Pigments?"

"Certainly. Any manufacturer ought to know that Krebs Pigments can easily take the 'show through' out of even the thinnest paper."

" 'Opacity' is the word, I believe," prompted the Man. "I wish you'd let me get on with my bath," he added plaintively.

"And speaking of cleanliness," the Gnu went on, "you ought to see the clean whiteness that Krebs Pigments give to paper. Brightness, too. It's positively amazing. And the Krebs people will gladly give any paper manufacturer all the technical information about pigments that he needs, free for the asking."

"Think of it!" said the Man.

"Do more than that," said the Gnu. *"Write* them!"

KREBS PIGMENT & COLOR CORP.
1007 Orange Street
Wilmington, Delaware

WASHINGTON •

▶▶▶ CATALOGUES AND OTHER LITERATURE pertaining to machinery used for the production of cellulose are desired by the Brazilian Technological Institute, a Department of Commerce report stated recently. The desire for catalogues was expressed by Dr. Virginio Campello who is one of the men charged with drawing up plans for a national cellulose plant to be constructed by the Federal Government. Literature should be sent to the American Commercial Attaché, American Embassy, Rio de Janeiro, Brazil.

▶▶▶ FROM THE AMERICAN CONSUL in Stockholm comes news that rigid control of wood pulp production has been decided upon in Sweden. Exports will be on a quota basis and prices will be decided by committees of representatives of each exporting country.

▶▶▶ PROPOSED FEDERAL LEGISLATION to establish rigid weight standards for containers of "dry groceries" including such products as cereals, biscuits and crackers, cookies, macaroni, flour, etc., is now under consideration. The legislation was proposed by the National Conference of Weights and Measures.

▶▶▶ PROPOSALS FROM thirty-nine bidders to supply the United States Government Printing Office with about thirty thousand tons of paper were presented on November 25 to the Joint Congressional Committee on Printing.

▶▶▶ DEPARTMENT OF COMMERCE RELEASES indicate that there is a widespread demand for information on how to pack goods for safe export shipment due to the entrance of firms into the export market which have hitherto confined their efforts to the domestic market. The Transportation Division of the Department of Commerce has prepared a comprehensive manual on the subject (Trade Promotion Series No. 207) which may be procured for $1.00 from the Superintendent of Documents, Government Printing Office, Washington, D. C.

INDUSTRY GIVES BLANKETS FOR GREAT BRITAIN

The need for wool blankets in England has resulted in a plan whereby paperboard mill felts are being made into blankets for people in the stricken country. The plan was acted upon by members of the National Paperboard Association at the suggestion of G. G. Otto of the Alton Boxboard Company.

This activity is being carried on in co-operation with the Maple Leaf Fund, Inc., 601 Fifth Avenue, New York, City, which is a Canadian war relief organization. Under the plan, the mill donates the felt and delivers it to the blanket manufacturer. The Maple Leaf Fund pays the cost of converting the felt into blankets and assumes the cost of packing and transporting the blankets to destination. It was reported that the first shipment—some two thousand blankets—is now en route to Great Britain and that under the schedule now under way the blankets will move continuously in increasing quantities.

"The Ramparts We Watch"

Member publications of the Associated Business Papers, Inc., received the letter reproduced below through a request of that body by J. Edgar Hoover. This magazine welcomes the opportunity to co-operate with the Federal Bureau of Investigation in its vigilant efforts to protect our people and industrial activity during these critical times.

JOHN EDGAR HOOVER
DIRECTOR

Federal Bureau of Investigation
United States Department of Justice
Washington, D. C.

October 31, 1940

Associated Business Papers, Inc.
369 Lexington Avenue
New York, New York

Gentlemen:

In the war-torn world of today America must strengthen her internal and external fortifications if she is to survive the menace of totalitarianism. The protection of our industrial facilities to insure the uninterrupted production of goods and material is essential to our national defense. Based upon this premise the FBI in September of 1939, in accordance with the request of the War and Navy Departments, inaugurated a program to survey the protective facilities of manufacturing establishments having large contracts to provide the government with defense materials. The purpose of the surveys is to submit recommendations to bolster the physical protective facilities of the manufacturing plants for the prevention of sabotage and espionage activities.

The first and final responsibility to give speed and strength to our national defense program by protection against espionage and sabotage lies with industry itself. Only through the energy and alertness of its officials and workers will the full measure of preparedness be attained.

In line with this plant survey program and to assist industrial concerns and municipalities in establishing effective protection against possibilities of acts of espionage and sabotage the FBI prepared a comprehensive booklet entitled "Suggestions for Protection of Industrial Facilities." Because of its confidential nature this booklet is limited in distribution to heads of duly constituted law enforcement agencies and executive officials of industrial concerns manufacturing defense materials under government contracts.

In response to the many questions as to how to obtain this publication I wish to state that a copy will be furnished an industrial concern upon the written request of an executive official.

Sincerely yours,

J. Edgar Hoover

John Edgar Hoover
Director

AMERICA'S LARGEST SUPERCALENDERS

General Electric D-c System Makes Possible Production of Shipping Rolls Right at Super-Calender—Record Nip Pressure—Quick Emergency Stopping

THE supercalenders at Champion's new paper mill at Houston top anything yet built in size and flexible operation. Another feature is the fact that shipping rolls are produced immediately after supercalendering, because the winder rolls are co-ordinated electrically with supercalender.

TOP SPEED: 2000 fpm.

WIDE RANGE OF SPEEDS: From 50 fpm (threading) and up, accommodating a wide range of products.

RECORD NIP PRESSURE: 3000 lb per linear inch.

QUICK STOP: Electric dynamic braking assures emergency stop in 8 seconds or less.

PRECISE AND FLEXIBLE CONTROL: Progressive engineering makes possible a smooth co-ordination of supercalender and winder. Electric instruments provide both an immediate picture, and a permanent record of operating conditions at any time. The operator's panel for each of the supercalender units provides complete control of the main and all auxiliary driving units.

Whether you are considering a job that is immense or modest in size, whether it requires turbine-generator, transformers, switchgear, motors, control, lighting—any one or all—it will pay you to buy General Electric. It will pay because of the expert engineering, consistently low-cost and reliable operation of equipment, and the quality of service you receive. Submit any electrical problem to our office nearest you, or write to General Electric, Schenectady, N. Y.

G-E drive for the world's largest supercalenders at Champion Paper & Fibre mill, Houston, Texas. Twenty-eight feet high, the supercalender is underslung by basing it below the machine room floor. Left: one of the two operators' control panels for each of the two 10-roll units. This panel provides 28 controls and 13 dials.

FAST AND FLEXIBLE SPEED AND POWER

OTHER INTERESTING FACTS ABOUT CHAMPION'S NEW SUPERCALENDERS (TWO UNITS)

Height	28 feet
Width of roll faces	194 inches
Bottom roll diameters	40 inches
Bottom roll weight	35 tons
Total weight, calenders and electric drives	450 tons

Products: Machine coated book, bond, envelope.

ELECTRIC EQUIPMENT:

2—500-hp d-c driving motors
2—400-kw motor-generators
2—75-hp winder driving motors
16—D-c motors for individual slitters
2—Operaters' panels, including 28 different controls

IMPROVEMENTS AT KVP FOR YEAR COST $400,000

The new buildings and equipment at the Kalamazoo Vegetable Parchment Company, Parchment, Michigan, cost approximately $400,000 thus far in 1940, according to an announcement by Jacob Kindleberger, chairman of the company's board of directors. The largest single item on this year's list of improvements was the new printing presses which cost $100,000. They are the latest type multiple color presses.

Among the larger expenditures Mr. Kindleberger noted were $85,000 for a new Parchment paper machine; $60,000 for new buildings, including a new $35,000 pulp warehouse; $60,000 for new English type Bertram beaters and refiners, and $15,000 for additional power plant equipment. More than 1,500 persons are now on the payroll.

◆

AUSTRALIAN MILL BEGINS OPERATIONS

The Australian Newsprint Mills, Pty., Boyer, Tasmania, is to begin production in December and will be in full swing by January, according to recent reports. While there have been inevitable delays in the delivery of certain equipment due to war conditions, the construction program is on schedule.

First of its kind in Australia, the new mill was financed by a group of Australian newspapers. Eucalyptus wood is being used, mixed with sulphite pulp from British Columbia.

Since the local paper output will necessarily be limited for some time, it is not likely that the present rationing of paper will be lightened. However, the local production is expected to be an insurance against stoppage of paper imports through enemy action.

◆

DE LUXE PACKAGE PRESENTATION

A clever and attractive approach illustrating the merits of clay coated boxboard is the Container Corporation of America's new publication "Consumer Meets Package."

The book, "Consumer Meets Package" consists of a number of die cut specimens which permit instantaneous contrast with the sheet underneath. The first specimen, in each case, is a patent coated board. Part of this board is cut out to permit the reader to see onto the next page which is a clay coated board. As both the patent coated and clay coated boards have identical designs, comparison between the two is made simple.

Readers are asked to compare the printed results and to judge for themselves what happens when "consumer meets package." This new book strikes a new high in de luxe presentations and is a most effective and well-done piece of work.

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Newer section of Kalamazoo Vegetable Parchment Company's plant after first snowfall of season. In the right foreground is the newly completed pulp warehouse.

FINNISH PAPER MILLS THAT NOW BELONG TO RUSSIA

Reports from a British journal, *The Paper Market,* give a complete list of the pulp and paper mills which were ceded to Russia by Finland. According to that magazine the mills which now belong to Russia are:

Enso Mills, belonging to Enso-Gutzeit, O.Y., which had an annual capacity of about 82,000 tons of sulphite cellulose, 85,000 tons of sulphate cellulose and 2,500 tons of paper and 30,000 tons of board; Hackman and Company's various establishments in Johannes, which produced about 47,000 tons of sulphite cellulose and 5,000 tons of paper and board; A. B. Hovinmaa Pappersbruk in Hovinmaa which had a production of about 3,000 tons of paper; O.Y. Laskela mills at Laskela and Leppakoski, which produced 26,500 tons of paper, 28,000 tons of sulphite cellulose and 20,000 tons of mechanical wood pulp; Pitkaranta O.Y. in Pitkaranta which produced about 48,000 tons of sulphite cellulose; O.Y. Waldhof, A.B. in Kexholm, about 97,000 tons of sulphite cellulose; O.Y. the Wiborg Wood Company in Suojarvi, about 8,000 tons of board, 3,000 tons of sulphite cellulose, and the Jylhavaara Mill which had an annual production of about 1,000 tons of brown wood pulp board and mechanical wood pulp.

The decrease in the productivity, available for sale, said the British report, within the cellulose, paper and board industries, totals about 257,000 tons of sulphite cellulose, about 133,000 tons of sulphate cellulose, about 37,000 tons of paper, about 40,000 tons of board and about 20,000 tons of mechanical wood pulp.

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▶▶▶ THE NEW PAPER MILL of Building Products, Ltd., Winnipeg, was opened recently. It will produce insulating board, wallboard, building papers and roofing felts.

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DARD HUNTER MUSEUM SOLICITS PAPER ITEMS

Time does fly, and it seems only a short while ago that the Dard Hunter Paper Museum was established at the Massachusetts Institute of Technology. Nevertheless, the Institute has shown a remarkably healthy growth since it was dedicated in June, 1939.

Dard Hunter, as Curator, has worked earnestly to make this valuable and interesting foundation a shrine for papermakers and anyone interested in papermaking history. It is his desire to constantly gather new material not only for exhibition purposes, but for reserve. Therefore, everyone in the industry is asked to be on the alert for anything that relates to the history and development of American papermaking. To give an idea of exhibits that would be welcome, the following might be mentioned: early ream wrappers, early watermarked papers, mill account books, maps and charts of mill properties, photographs of mills and their interiors—in fact, anything that relates in any way to the subject of American papermaking. Such items should have a permanent place in the Dard Hunter Paper Museum.

◆

. . . now superior .009" Board formation with Stream Flow Vat System

Stream Flow Wet End of .009" Cylinder Machine for making corrugating board from Chestnut

Better formation . . . higher speed . . . freer stock. Here is proof of the profits you can earn with the Puseyjones Stream Flow Vat System.

A new Stream Flow Wet End on a .009" board machine permits regular operation at top drying and driving speed of 360 F.P.M. The machine was previously limited by formation to below 325 F.P.M.

The stock is a difficult one to handle. Formerly, the stock had to be made excessively slow to form properly. The new Stream Flow Wet End gives much improved formation at freenesses two or three times as high.

Previously the weight variation averaged about 6 lbs. for a sheet weighing 26 lbs. per M sq. ft. The Stream Flow Vat System now forms an automatically level sheet without any manipulation by the machine tender.

Seventeen Stream Flow Vat Systems are now in operation or under construction on a tremendous range of products—from tags and bristols to roofing felt and .009".

These are a few of the reasons why you cannot afford to delay your own investigation of what the Stream Flow Vat System can do for you. Write for further facts.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-making Machinery. Wilmington, Del.

HOPPER OFFSET PAPER DRAMATIZED IN NEW BROCHURE

One of the most beautiful presentations on the subject of offset papers yet to reach this magazine's editorial department is the new deluxe offering of the Hopper Paper Company, Taylorville, Illinois . . . "Offset for Color."

This plastic-bound book contains a dramatic, graphic story of the company's offset paper, showing, by the use of numerous full-color illustrations, how convincing the use of the paper can be for sales or advertising presentations. The publication reveals the fine detail of work that is possible with the paper and shows, in a convincing way, the versatility of the product. The designers and compilers of "Offset for Color" deserve much praise for this offering which rates among the finest.

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FINANCIAL

Paper mill securities shared in the increased buying interest seen in the securities markets during the past month, though a natural fear of future developments has held prices below those which would normally be popular considering the earnings of the various companies, both paper and other industrials.

American Writing Paper Corporation—Net profit for the nine months ending September 30 was $32,186, as against $103,567 for the same period in 1939. This figure, however, is after deduction of a reserve of a considerable sum to provide against a sharp reduction in the price of pulp, a considerable quantity of which has been accumulated at prices not yet reflected in the added cost of the paper produced.

Certain-Teed Products Corporation—Net profit for nine months ending September 30 were $541,143, as compared with $348,592 for the same period in 1939.

Eastern Corporation — Earnings for the quarter ending September 30 were $73,142.94 and for the nine-month period, $57,953.16. Provision for depreciation and depletion, however, for the three months was only $78,606.72 as against a provision for the three quarters of $235,820.16.

Flintkote Company—Net profit for twelve weeks ending October 5 was $561,881, as against $532,775 for the same period in 1939.

Gaylord Container Corporation — Net profit for the nine months ending September 30 was $1,010,093, as compared with $317,904 for the same period in 1939.

Hinde and Dauch Paper Company—Net earnings for nine months ending September 30 were $682,018, as compared with $422,305 for the same period in 1939.

International Paper Company — Net profit for the nine months ending September 30 was $12,214,551, as against $725,301 for the same period in 1939.

Masonite Corporation — Net profit for the year ending August 31 was $1,659,348, as against $1,163,050 for the previous year.

Mead Corporation — Earnings for the forty weeks ending October 5 were $983,187, as against $246,517 for the same period in 1939.

Minnesota and Ontario Paper Company—Net profits for the nine months to October 1 were $1,849,676, as against $608,245 in the same period of 1939.

Nashua Gummed and Coated Paper Company—Net earnings for the nine months ending September 30 were $220,237, as against $118,659 for the same period in 1939.

Nekoosa-Edwards Paper Company—Net income for the September quarter was $146,304, as against $194,474 in the June quarter and $90,553 in the March quarter of this year.

Oxford Paper Company—Net earnings for the nine months ending September 30 were $637,571, as against $383,918 for the same period in 1939.

Puget Sound Pulp and Timber Company—Net earnings for nine months ending September 30 were $822,763, as against $2,332 for the same period in 1939.

Rayonier, Incorporated — Earnings for the six months ending October 31 were $2,139,109, as compared with $870,152 for the same period in 1939.

Scott Paper Company—Net earnings for nine months ending September 30 were $1,096,598, compared with $1,223,735 for the same period in 1939.

Soundview Pulp Company — Net profit for ten months ending October 31 was $1,791,236, as against $397,157 for the same period in 1939.

Sutherland Paper Company — Net profit for the year ending September 30 was $848,881, as against $655,784 for the previous year.

Union Bag and Paper Company — Net earnings for the nine months ending September 30 totaled $2,315,167, as against $440,051 for the same period in 1939.

United Paperboard Company — Net profit for the quarter ending August 31 was $27,707, as compared with a loss of $42,598 for the same quarter in 1939.

A compilation of earnings of major companies, twelve in all, by the National City Bank, shows annual return for the first nine months of this year of $10,523,000, as against $3,913,000 for the like period in 1939.

Dividends declared during this month include 25 cents on the Mead Corporation common, the first payment since 1937. Scott Paper Company has declared a quartely dividend of 40 cents plus 25 cents extra; Great Northern Paper Company, a quarterly 50 cent dividend plus 50 cents extra; and Johns-Manville, $125, as against 75 cents in September. West Virginia has declared a 40 per cent dividend of the common, payable January 2, and the payments through 1940, exclusive of this payment, were $1, as against 20 cents for all of 1939.

New York Stock Exchange—Stocks

	Closing Prices Nov. 25 1940	Oct. 25 1940
A. P. W. Paper Co.	*2⅛	2¼
Celotex	7½	7⅜
Same Preferred	63	61
Certain-Teed	5½	4⅞
Same Preferred	37⅛	31
Champion P. & F. Co.	22½	*22–22½
Same Preferred	104¼	*101–102
Container Corp.	16	17⅜
Cont. Diamond	7⅜	7
Crown Zellerbach	16⅛	15⅜
Same Preferred	91½	88
Dixie Vortex	10¼	*10¼–10½
Same "A"	36	*35–37
Robert Gair	2¾	*2¾–2⅞
Same Preferred	15⅜	16
Gaylord Container	12½	11⅞
Same Preferred	49	*44½–51
International P.&P. Co.	17⅜	15⅛
Same Preferred	69⅜	61½
Kimberly-Clark	37½	35¼
MacAndrews & Forbes	31	*29⅛–30
Mead Corp.	9½	8⅜
Same Preferred	*75–80	*73–75
Paraffine Co.	38	37
Same Preferred	*99¾–103	99½
Rayonier	17⅞	*16¼
Same Preferred	27½	*26–28
Scott Paper	38	41
Same 4½% Preferred	112	*113⅛
Same 4% Preferred	108½	*108–110½
Sutherland Paper	23	*22½–23
Union Bag & Paper	13½	11¾
United Paperboard	4¼	*3⅛–3⅜
U. S. Gypsum	68	75½
Same Preferred	174	*177–180

New York Stock Exchange—Bonds

Celotex 4½%	88½	—
Certain-Teed 5½%	89	86½
Champion P. & F. Co. 4¾%	105⅜	103¼
Inter. P. & P. Co. 5%	102⅜	103⅞
Same 6%	105	102⅛

New York Curb Exchange—Stocks

Am. Boxboard	4¾	*4⅛–5⅜
Brown Co. Pfd.	19¼	*19–21½
Great Northern	43	*39½–40½
Hummel Ross	6¾	*6½–6¾
Nat. Container	11½	*11⅜–11½
St. Regis	2¾	2¾
Taggart	4	*3¼–3⅜
United Wall Paper	1⅜	1⅞

*Closing Bid and Asked Prices.

BRIEFS

▶▶▶ STEPS TOWARDS THE ENLARGEMENT of the Peter J. Schweitzer, Inc., plant at Elizabeth, New Jersey, have been taken with the near completion of a $30,000 addition. This is the first step in the proposed million-dollar expansion of the company's facilities. The output of the company will be increased about fifty per cent, most of which will be for the production of cigarette paper.

◆

▶▶▶ IN AN ACTION INITIATED by the company, the Thilmany Pulp and Paper Company announced on December 1, a wage increase of about five per cent effective on that date. About 900 hourly paid employees will be affected. This is in addition to an increase inaugurated in June when a regular union contract was negotiated including a new vacation plan.

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▶▶▶ THE OLD WATERFALLS PAPER MILLS, Mechanic Falls, Maine, will soon be in operation again says a report from the East. Frederick E. Macy, head of the A. M. Collins Manufacturing Company, Philadelphia, will be the operating executive of the mill. The output will be handled by the Collins organization.

▶▶▶ THE TANGLED AFFAIRS of the Abitibi Power and Paper Company are still unsolved according to late news from Canada. The McTague Royal Commission, appointed by the Ontario government, to inquire into the affairs of the company, held several sessions during November and after several hearings adjourned to resume the hearings in December. No satisfactory reorganization plan has yet been decided upon.

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▶▶▶ CONSTRUCTION OF A $150,000 apartment house building at the Oceans Falls (British Columbia) plant of Pacific Mills, Ltd., will soon be under way, it was reported. The apartment building, the second to be built, will have accommodation for 42 three-room suites, all completely modern. Contracts for its erection have already been let and work is expected to begin at once. A similar apartment block was erected by the company earlier this year at the same cost.

▶▶▶ PRODUCTION OF BUILDING PAPER has now begun at the Powell River Company, Powell River, B. C. The firm installed a laminating machine a year ago and has now decided to produce five grades of "Llama-brand" building papers. Canada Roof Products, Ltd., Vancouver, is sales agent for British Columbia and Alberta.

◆

▶▶▶ FIFTEEN KILTED MEMBERS of the Powell River Company band recently completed a good will tour of the southwestern states and were given a triumphal reception when they returned to Vancouver. They were congratulated on behalf of the federal and provincial government and the City of Vancouver.

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▶▶▶ THE MAIN OFFICES of the Brown Company are now located at Berlin, New Hampshire, home of the company's pulp and paper mills. This move coincides with the closing of the company's offices in Portland, Maine. H. P. Carruth, general manager, is now located in Berlin as are all departments of the company with the exception of the sales offices. The latter are at 500 Fifth Avenue, New York City.

SELF-SEALED BEARINGS

"9000-DD", with Double Metal Seals, here shown; also made as "9000-D" with Single Metal Shield.

LARGER GREASE CAPACITY NO SEAL DRAG

IN "9000" SERIES (Feltless)

Interchangeable in dimensions with felt seal bearings.

Employs simplified, inwardly extending, flanged metal shields which do not rotate and cannot "foul" other rotating seal parts.

Seals are highly efficient in retaining grease in either horizontal or vertical position.

Simple seal occupies less space within bearing than felt seal, PROVIDING GREATER GREASE CAPACITY AND A MORE LASTING LUBRICANT SUPPLY.

Metal seals, though close fitting, clear recess on inner ring, ELIMINATING "DRAG" OR FRICTIONAL RESISTANCE and power loss, and providing higher starting speeds and increased efficiency. Seals cannot wear and are permanently effective.

Totally sealed against foreign matter, providing absolute cleanliness at all times.

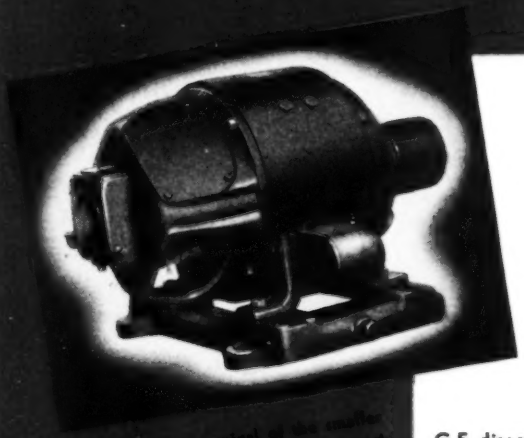
"NORMA-HOFFMANN"

PRECISION BEARINGS

BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U.S.A.

There's DOUBLE in the NEW FEATURES



G-E direct-current motor, Type CD, typical of the larger ratings.

An improved ventilating system, designed for reversible rotation, gives positive axial ventilation through the motor.

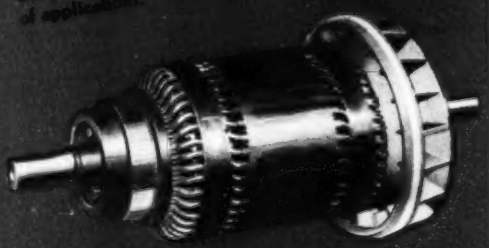
The same bearing bracket is used for ball and sleeve bearings, and the bearings can be removed without disturbing brush-rigging connections.

The larger motors have a new "V-type" brush holder designed for reversing service.

Split construction of the highly efficient fan scroll, which forms the drive-end bearing bracket, allows the scroll to be removed easily.

The radial-blade fan is cast-aluminum and specially designed for use in reversing service. The fan is rabbetted and bolted to the armature spider.

G-E direct-current motor, Type B, typical of the smaller ratings. Additional protective features and the compact design make it readily adaptable to an increasing number of applications.



Armature is dynamically balanced. Welded end fingers hold laminations tight. Radial ducts in punchings, and openings in the 4-arm spider that holds them, provide positive ventilation.

The commutator is baked while under high pressure. Thin die copper and mica segments are drawn together under high pressure while the commutator is still hot. Red Glyptal varnish applied to the end of this unit provides a smooth, arc-resistant subsoil.

PROTECTION

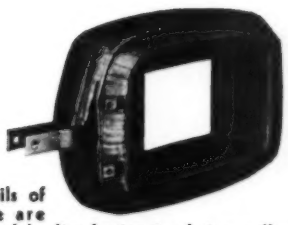
of G-E Direct-current Motors

Exposed Parts Protected against External Damage

The over-all design of the open motor makes it readily adaptable for use even on jobs that have natural hazards to motor life. It not only safeguards the motor parts, but also increases safety for workmen.

Protected Internally against Electrical Failure

Electrical protection is gained through the use of Formex magnet wire in the armatures and field coils, and by a final treatment of a specially developed Glyptal base insulating varnish which gives additional value to the other fine insulating materials used.



Main field coils of Formex wire are wound on spool bodies having insulating collars that insulate coil and pole from frame. Each coil is taped, dipped, and baked. A completed coil is shown above.

OTHER new features of G-E d-c motors include such improvements as cast-aluminum fans specially designed for reversing service; reversal without changing any part of the frame, fan, or brush rigging; compact assembly; more positive ventilation; lower WR^2; small diameter, which means low headroom needed; and interchangeability of ball- and sleeve-bearing brackets on the larger motors.

These and additional features which all sum up to increased all-round performance and protection are rolled-steel frames, V-type brush holders, cast-brass brush-holder boxes, accurately centered rabbet fit of precision machining, extra large conduit box, provision for lubricating and flushing of bearing while motor is running, punched commutator segments, Textolite wedges in armature slots for winding protection, and constant air gap.

All current-carrying parts and rotating parts, except shaft extensions, can be enclosed readily for protection of operators.

Surely you will want to learn more about motors with such outstanding improvements. These G-E direct-current motors are being applied in increasing numbers on jobs for which standard designs formerly were not recommended. They are fully fitted to fill the bill on your jobs. Call our local office. General Electric Company, Schenectady, N.Y.

Main field pole pieces are laminated silicon steel, welded together and securely bolted to rolled-steel frame.

Commutating coils are made of edgewise-wound copper strip with enamel turn insulation, and are insulated from the pole by a layer of laminated acetate paper.

Continuous rabbet fit of rolled-steel frame assures accurate concentricity and alignment of the bearing bracket. Additional insulation protects the basic dielectric strength of Formex wire, and red Glyptal varnish protects the coils.

GENERAL ELECTRIC

ADVERTISING PAGES REMOVED

WEST COAST HEMLOCK PULP

THE HIGH CLIMBER has the job of topping and then helping to rig spar trees, which have been chosen to support the steel cables that are the life-lines of West Coast logging.

PULP DIVISION ‡ WEYERHAEUSER TIMBER COMPANY

EDITORIAL

Demand for Durable Goods Insures Good Paper Market

▸▸▸ BACK OF THE FACT that the paper industry's operating rate during November was 89 per cent lies a right interesting story.

The great bulk of the paper production is going into the converter division due to the continued expansion of the demand for capital and durable goods.

During the past decade, the durable goods division of American industry has been on the wane, but during the past sixteen months, it has come back slowly at first, but gaining momentum and volume every month until today it constitutes the main prop in the industrial tonnage picture, not only for general business, but also for the paper business. As for the consumer goods demand, we have witnessed a market decline during the past six months. Had we had a volume of consumer demand even approximating the average of the past three previous years, the paper industry now would be enjoying a merry market situation.

Following the collapse of France in June last, the demand for consumer goods was cut clean as though with a sharp knife. Consumers became hysterical. They feared the immediate conquest of England by the Germans and a consequent demoralization of all trade relations in all parts of the world, especially in the United States. Never in our time have we seen or known of such a near buyers' panic.

From this no-buying panic of consumers goods, we have not as yet fully recovered. In the meantime, the upsurge in buying demand in the heavy durable goods industries has risen steadily and impressively. It is estimated that the government expenditures for the month of December will aggregate $400,000,000, and will continue at that figure as a minimum for the first half of next year, when it will increase sharply. War or no war, so the advices state, the preparations for the adequate defense of the United States will continue with unabated pressure until the program for the proper defense of this country is assured. That means it will take the country until 1945 to reach a peak of production in all those tremendous divisions of capital goods production.

Remember that the outbreak of war caught this country at the lowest point of its industrial equipment. There had been no capital goods expansion. On the contrary there has been heavy contractions due to the fact that for ten years obsolesence had not been restored and the charge-off for depreciation of our industrial machine had not been renewed. Capital goods production lapsed; big business slowed down and much small, industrial business folded up. A total absence of new investment in new machines or new business. That was the nadir of our industrial processes. Then bang! The European war burst forth. . . . Things changed.

It took from September 1, 1939, to May, 1940, to arouse this nation to the sense of its defensive deficiencies. On May 10, we had the call for 50,000 planes. Following swiftly came the mandate from the people for Congress to appropriate limitless billions for defense. It did. Hence was born the demand for capital durable goods, which today, having barely started, has generated a demand for pulp and paper products, sufficient to maintain the paper mills schedules at 89 per cent for November.

Upon this demand will be superimposed the artificially suppressed consumer goods volume which is as certainly on the way as old Mother Hubbard was when she went to the cupboard to get a bone for her dog, but when she finally got there, there was no bone.

Of course, there will be pulp and paper in the months and years to come, but not in the profligate quantities that American consumers have been wont to use. Of that, there can be no doubt.

The United States has not only its own domestic demands to fulfill, but seeking lodgment in our mills are orders in constantly increasing volume from all those continents and countries that were formerly supplied by Europe. Europe is engaged in producing armaments and munitions of war to its utmost capacity. Those commodities have the priorities over civilian supplies. So, too, this country is rapidly absorbing more and more of the total machine hours of industry for the production of war and defense commodities and they, too, will obtain priorities over supplies for civilian consumption.

In our judgment, a good stock of pulp and paper is prime property to possess.

A Few Ideas

▸▸▸ NOTHING IS MORE IMPORTANT to the success of a pulp and paper mill organization than ideas. It is upon them that a mill organization either thrives or wastes away. If the culture of ideas is good, the business is strong and potent; if not, the opposite is so.

The mill itself is tangible evidence of the importance of ideas. It took ideas to conceive the project. Ideas were needed to locate and design the plant. They also were required to put the mill into operation; and they, too, are necessary to keep it in operation.

Good ideas are like stepping stones which must be sufficiently close together to permit safe travel across them. They are well-designed tools ready to be put to work by a competent workman. They are germ cells which must be nurtured and fed if they are to bloom to the full fruition of their possibilities.

Constructive ideas are not the property of any one person. They may emanate from any normal human being no matter how menial his task. Some of them may be simple and worth little; others, important, far reaching, and valuable.

Therefore, as an official or executive in your mill, make it a practice to welcome ideas. Weigh them. Sift the wheat from the chaff. Put the constructive ones to work as time and opportunity affords. In them will be preparedness for tomorrow.

CURRENT THOUGHT

"IS THERE A SANTA CLAUS?"

WILLIAM SIBLEY

▸▸▸ A YEAR AGO THIS MONTH —William J. Cameron gave a talk on the above subject over the Ford Sunday Evening Hour. This talk impressed me so much I wrote for a copy of it, that I might re-read it at will. Several times during the past year I have been inspired by it. I have just read it again—and the thought occurred to me that this being the approach of another Christmas season, here was a splendid thing to pass on to the readers of THE PAPER INDUSTRY AND PAPER WORLD. I quote it in full:

"It is the week before Christmas and all through the land little folk are putting the very real question: Is there a Santa Claus? A hard question to answer for the simple reason that the answer is Yes, and it needs wisdom to say Yes. This may explain why some grown-ups do not—at least they *say* they do not—accept the fact of Santa Claus. But you will notice they never quite stop there. They go on to explain, and the more they explain, the more their *No* begins to sound very suspiciously like *Perhaps* or *Yes*. If there were no Santa Claus, does anyone suppose that 40 million conspiring American parents could keep the merry old saint alive? Cold analysis now!—isn't it a fact that he is more the saint of the elders than of the children? The skepticism of grownups is not quite so thoroughgoing as it seems.

"Now, this is in no sense a Christmas question, that is why we deal with it *before* Christmas. Santa Claus has any day and every day, but not particularly nor traditionally Christmas Day. That belongs to another Person who came not only bearing gifts but was Himself a Gift—the incomparable gift that *made* Christmas. Moreover, it is not exclusively a childhood question but one that adults also might well be asking. Of course, someone will have to ask it for them because they suffer from the illusion that they are entirely disillusioned in this matter. Few things are more amusing than the modern man's illusion that he is a disillusioned realist. Were he really a Realist, he would be walking in wonderland. But full of illusions, like the no-Santa-Claus illusion, he walks under gray skies, along drab, dull ways. Somewhere between morning and noon he lost a bit of primal knowledge, and year by year, as Christmas returns and children bring the breath of morning, he seeks to recover it. He thinks it's a *dream* he once had; rather, it is a *fact* he once *almost* apprehended.

"The Santa-Claus symbol is so beautiful it blinds us to the stark reality behind it. We shall not say tonight, in the language of a famous editorial, that Santa Claus is faith, poetry, love, romance—human good will and sentiment in expression—it is something more tangible, something wholly material, that goes much farther back than the birth of human sentiment. For there actually was presented to man in his childhood a pack of gifts so great and so constantly renewed that he hasn't yet finished sorting them.

"Where did we get fire? Did someone make it? No man can *make* fire. Where did we get air? Did some human genius discover, or invent and manufacture it for us? No man can *make* air. Where did we get soil fertility? Where did we get this column of watery substance in which we move around all day, in which we rest at night—this human body? Who organized the vital chemistry by which, without knowing how, we actually perform the miracle of turning wheat into nerve and eye-lenses and brain and muscle? Who decreed that if man eats ox, ox shall become man, not man ox?—that the stream of life shall always flow uphill? The lowliest human being is presented with a bundle of gifts and powers the utmost wisdom of the ages has hardly succeeded in identifying, let alone understanding and duplicating. And yet we say that the belief in Santa Claus has no basis in reality!

"Man's environment is friendly—what made it friendly? The *illusion* persists that environment is hostile because it prods and goads us when we succumb to downward gravitation—this is not hostility but stimulus. What a stimulating gift *fire* has been! To the animal it *is* hostile, but we carry fire in our pockets—in match and electric torch. We kindle it in a furnace and mingle it with other things given to us—things no man ever could *make*—iron, carbon, nickel, tungsten and a score of similars—and by obedience to laws these gifts disclosed to us, and by the friendliness of environment to our infant efforts, we make the implements of civilization. Can we make *fire?* We can only learn how to *get* and to *use* it. Can man in any sense *create* the original elemental qualities of metals, or *compel* their union and coaction in new alloys? No. These gifts, poured upon him in his racial infancy before ever he knew what they were, have been first his toys, then his tools and then the machines that relieve his burdens and supply his needs. Gift on gift—cold, heat; darkness, light; things above and on and under the earth, all blending in friendly co-operation when we learn *their* nature by unfolding *our own*—why! the Santa-Claus *symbol* is only the faintest suggestion of the *fact*.

"That is the pre-Christmas—the Santa-Claus — story. Man's stocking crammed with marvelous presents, wonderfully, magically conveyed. But getting and holding are not the goal of life; using and serving come next. In the older Christian countries Santa Claus and his gifts come days *before* Christmas—which is a parable, for so it was in human history. Then Christmas came and with it the new note—of building the spiritual superstructure, the good life, on this lavish material supply, *given* to us, *not made by us*.

"Is there a Santa Claus? Yes, but that is not His name."

Deinking of Waste Papers

RODERICK O'DONOGHUE
Pulp and Paper Mill Consulting Engineer

▶▶▶ THE FIRST PART OF the nineteenth century saw a rapid development in the use of paper machines with a consequent reduction in paper manufacturing costs and an increased paper consumption. As rags were still the chief papermaking raw material and the amount of them was limited, some thought was given to the use of waste paper in the manufacture of the better grades of paper. This work commenced during the latter half of the eighteenth century in Germany; and, in 1800, Matthias Koops, using pearl ash as the deinking agent, established a deinking system in an English mill. Credit is given (*1*) to Henry E. Rogers as the first papermaker to put a deinking system into operation in the United States. This installation probably dates back to about 1849.

The development of mechanical and chemical wood pulps during the latter half of the nineteenth century gave added impetus to paper consumption and to an increasing use of waste paper.

During the early part of the present century, there was a tremendous growth in the Canadian newsprint industry. Many of the older mills in the United States were forced by this competition into the manufacture of better grades of paper, and it was during this period that the deinking of waste paper perhaps had its greatest advancement. This advancement was accentuated during and after the World War, when wood pulp prices soared. At the present time, there is an increasing interest in deinking due to the shortage in wood pulp caused by the existing war.

Advancement in the Art

In 1801, Matthias Koops writes (*2*) "my invention of re-manufacturing paper is carried on with great success, and where there are already more than 700 reams weekly manufactured of perfectly clean and white paper, etc." At the present time, there are mills able to produce 100 tons per day with the aid of modern methods and equipment. From 1801, to date, there have been an untold number of systems invented and tried out, most of which use alkalies and soaps to loosen the ink from the fibers.

At the beginning of the century in this country, the only practical systems in use were on waste papers free from groundwood and in which soda ash and caustic soda were the detergents. This condition applies today with few exceptions, and these exceptions have been due to the recent development in the chemical field of new wetting agents and detergents. As a result, a distinct improvement in deinking including papers with a groundwood content should be anticipated.

Twenty-five years ago the mechanics of deinking were covered by several common systems: namely, (*1*) Open tank cooking system; (*2*) Cooking engine; (*3*) Rotary cooker; (*4*) Winestock defibering and deinking process.

The open tank cooking system consisted of one or more vertical sylindrical tanks, each equipped with a perforated false bottom and a central pipe, both of which could be raised. Sorted waste paper, water and chemical were added to each tank, and steam turned on below the false bottom forcing the liquor up the central pipe, and over the mass of paper intermittently. When the ink was loosened by this soaking process, the false bottom was raised and the paper discharged. The cooking liquor was drained off and returned to the system where it was built up in strength for a new charge. About one-third of the liquor was not recovered. Actual consumption of soda-ash amounted to about 6-2/3 per cent of the amount of book or magazine papers used. A cook would take 6-9 hours on book, 10-15 hours on ledger, and a complete cycle required from 11-19 hours. The system involved crude operations and bad working conditions.

An iron tub beater with a steel cover was used in the cooking engine system. After the paper and chemicals were added to the tub, the cover was bolted down and steam turned on. Cooking took 2-3 hours using about 10 per cent soda ash, and a stock consistency of 5-6 per cent. The pulp was dumped, and then washed and bleached in a washing engine. The batches were small, and the power required was high.

The rotary cooker system used horizontal cylindrical or spherical rotaries. It was superior to the previously mentioned systems, in that stock was treated at 30-35 per cent consistency. Likewise, there was considerable internal friction and consequent fiber separation with little power. However, the action was slow, requiring four to eight hours under 25-50 lb. steam pressure, without considering the time to relieve pressure, empty, and fill again. The color obtained was good, 6-10 per cent soda ash being required, depending on the paper being treated.

In the usual rotary cooking system, the pulp was dumped into drainers or chest, and then pumped to beaters equipped with washers. It took 2½ hours to wash, ¾ of an hour to bleach (in the same beater), and ¾ of an hour to re-wash and dump. All of this time, with poor efficiency on power expended, the stock was being circulated and further hydrated. This system takes too much time, equipment and labor for the results obtained; but there is no reason why rotary treated pulp should not be washed and bleached under modern methods.

The Winestock process utilized a piece of equipment developed and patented about 1910, in which the deinking action was largely mechanical. The defibering action was caused by the thrashing action of propellers, in a cylindrical tank of special arrangement. The time of deinking was about 45 minutes on ledger stock, 30 minutes on book and magazine. It took about 50 hp. while defibering and held 900 lb. of paper. The charge usually was given preliminary soaking in an overhead tank equipped with an agitator. The charge to which about 5 per cent soda ash was added in the soaking tank was heated to 180 deg. Fahr.,

and agitated for 15 minutes. It was then run by gravity into the Winestock machine where it was defibered at 3½ per cent—5 per cent consistency.

Printed Papers

The introduction of paper highly loaded with calcium carbonate filler has made deinking more difficult. This is because of the affinity of the filler for ink and the resultant production of insoluble compounds. Also insoluble compounds. Also insoluble compounds, such as calcium caseinate, are formed when casein coated papers are used.

The development of machine coated papers also has introduced a number of problems. A large part of machine coated papers contains groundwood, say 30 per cent, which is objectionable in ordinary deinking practice. Then these papers are heavily loaded in the furnish plus the coating. Their total ash content may be from 40-60 per cent.

As practically all loading and coating are lost in the drastic washing action necessary in deinking plus a goodly portion of short fibered stock, shrinkage in the deinking of machine coated papers is high. On top of the shrinkage, these papers are largely printed with "Heat-set" inks which are harder to deink.

In the past, most papers were printed with oil base inks which consisted of finely divided carbon and mineral colors in an oil vehicle. This vehicle might be oxidized, boiled linseed oil, soya bean oil, etc.

The cheaper inks for newspapers, etc., are prepared with resin and mineral oils plus asphaltum, pitch and other ingredients. To give a glossy surface, gum resins such as Damar and Kauri are added. For quick drying, such materials as red lead, borate of manganese, etc., are added.

The high speed presses of today require quick drying inks. Newsprint is not sized, so the ink is quickly absorbed by the fibers. On finer paper, however, where the surface must be smooth and hard for good printing, ink is absorbed more slowly. To avoid smudging on this latter paper, the Heat-set inks have been developed. These inks consist of a large percentage of volatile material with a resin base. In printing, the paper is heated to a high temperature which drives off the volatile materials and bakes on what remains into a hard film.

Another recent development is in the use of Cold-set inks which are applied hot to heated rolls and plates. When applied to the camparatively cold sheet of paper they set quickly.

Another recent innovation is that of spraying the printed sheet with flour and water, wax, etc., to prevent offset. In addition, there are papers which are lacquered or varnished to give a high gloss.

Printed waxed papers have increased in amount, but cannot be used unless dewaxed.

It can be seen from the above that modern printing technic and consequent paper characteristics present problems in deinking which are new.

Strachan (3) gives the actual action of alkaline solutions on printed papers as follows:

1) Neutralization of alum in the paper, followed by rapid percolation of the cellulose by alkaline liquor.

2) Saponification of natural resins and sizing in and around the cellulose of the fibers, and to a limited extent of the dried oily matter of the ink, followed by a loosening of adherent films of the latter.

3) Complete loosening of the dried ink by friction of the fibers against each other.

The use of soap results in a similar solution of resins and saponifiable matter, and is most useful in the removal of inks containing resin and mineral oils, but the difficulty is to find a soap cheap enough for the purpose. As a rule the soap provided by the solution of resins and fatty matters in the waste papers is quite sufficient without the further addition of fats.

Strachan also states that "printed papers carry on the average about one-half per cent by weight of printing ink." This figure may be low. In newspapers it is 1½ per cent to 2 per cent.

The successful deinking of present day printed waste papers boils down to the necessity of a suitable chemical treatment carried out economically and with as little harm and loss to the fibers as is possible. It is evident that time, labor, power, steam and chemical cost are the important factors, the first probably the most important, as it affects most of the others.

In order to reduce time, the ink must be quickly loosened and the fibers separated one from the other. Wetting agents will help in this action, also the addition of heat, and a larger concentration of the alkali. By agitating the stock at high consistency, the defibering action is speeded up with the added advantage of lower total power, steam, and chemical cost. If the consistency is high, the same amount of chemical will be in more concentrated form. However, the effect on the fiber is less drastic if the time element is reduced and the temperature kept low, as can be done by the use of wetting agents. Again it is economically possible to use these chemicals by carrying on the reaction at high consistency.

Another advantage of quickly deinking waste paper is that the stock is freer and more nearly of the character originally used. This fiber condition is of great importance in making some grades of paper. A long period of soaking and agitation required in some systems gives a slow, weakened stock of mushy feel which is generally undesirable. Such a stock can be obtained from freer stock, if desired, by treatment in refiners, beaters, or jordans.

In addition to soda ash and caustic soda, the following wetting agents and detergents may be used to advantage in the deinking procedure:

1) Oleic acid
2) Gardinol
3) Duponol W. A. and ES pastes
4) Silicate of soda
5) Du Pont MP-202 detergent and emulsifying agent
6) Tergitol

Deinking Steps

The various steps generally required in the deinking conversion are as follows:

1) Waste paper storage
2) Waste paper sorting
3) Waste paper disintegration and deinking
4) Waste paper screening and washing
5) Deinked stock bleaching
6) Deinked stock beating and refining

Waste Paper Storage

There is a seasonal fluctuation in the amount of waste coming into the hands of dealers. This fluctuation particularly refers to materials coming from homes, and is greatest in the spring and the fall when people clean out accumulations. The sorter and broker commonly have no extensive storage facilities, and, therefore, will sell cheaper at those times. Thus, adequate mill storage is an aid toward lower costs, and as an insurance against uninterrupted supplies.

The waste paper is delivered to the mills in large bales, weighing individually from 1000 to 1800 lb., depending on the kind of waste. If piled one bale high, such bales take up about 12 sq. ft. of floor space per ton. Storage area may be saved by using a crane or other suitable materials handling equipment, and piling two or three bales high.

Paper as received should be weighed and tagged for further reference. Where several grades are bought, this fact also should be recorded.

Sorting of Waste Paper

The dealer originally sorts the waste into various grades and removes some of the dirt and foreign matter. How-

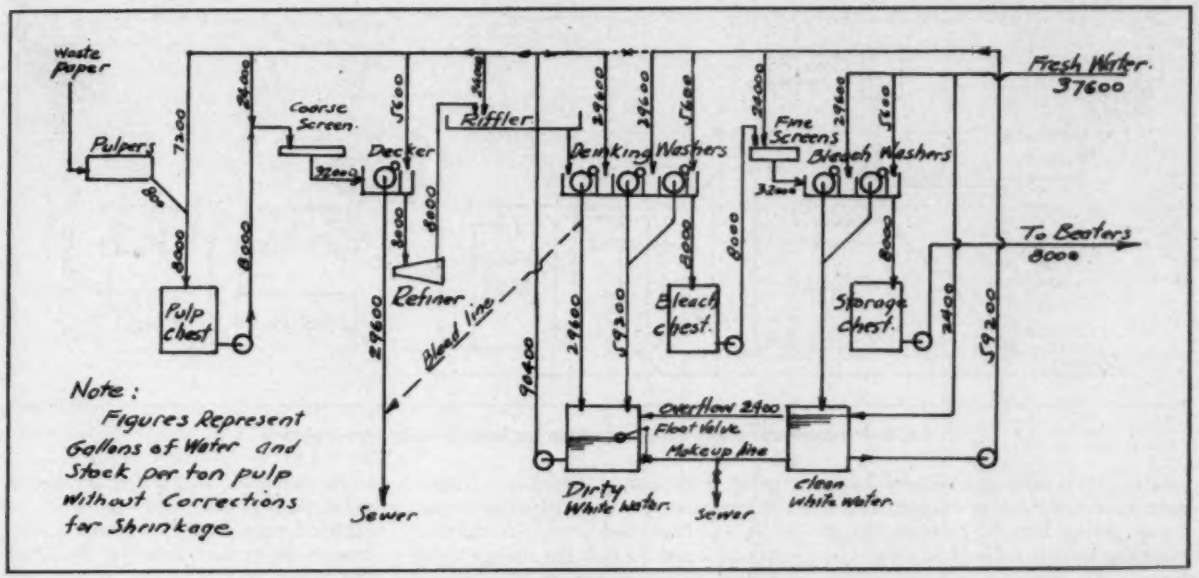


Fig. 1—Flow diagram of pulper-refiner deinking system.

ever, unless the mill pays a special premium to eliminate certain objectionable kinds of paper, it is desirable for the mill to re-sort and dust the paper as usual tolerances allowed by the merchant are not close enough.

To carry on this operation, the bales may be opened and fed into a rotary duster. This device is an open-ended cylinder slightly inclined to the horizontal, and covered with coarse wire mesh cloth to allow dirt to fall through. Pamphlets, books and magazines are opened up as they tumble around inside the machine, discharging from it onto a sorting conveyor which is running at about 50 f.p.m. and along which girls are located to pick out undesirable papers, such as those with groundwood content, etc.

This arrangement saves a great deal of labor over the older method of sorting directly from bales to a conveyor.

It is also more desirable and economical to do all sorting in one 8-hour shift. In this case, at least 16 hours wet or dry storage must be provided.

For wet storage, the paper is put into slush of about 7 per cent consistency in a tank preferably provided with agitation. For dry storage, the paper is torn into small pieces and then blown or conveyed to bins.

Present Deinking Systems

The common deinking systems now in use are:

1) High density pulper and refiner system

2) High density pulper and low density high speed circulating system

3) Rotary cooker system with refiner

4) Low density high speed circulating system

The first three systems are suitable for dry storage while the last system may use either.

In the high density pulper and refiner system (Figure 1), pulp is deinked and disintegrated in pulpers of the Jones, Lannoye or Voith type. These machines have a capacity of 1000 to 2000 lb. per hour, depending on the wetting characteristics of the waste paper. Chemicals, water and steam are fed into the pulpers with the paper. It takes about eight minutes for the stock to pass through them during which time deinking takes place. The pulp discharges from the pulpers at 30-35 per cent consistency and at a temperature of 160-200 deg. Fahr., depending on the stock being treated.

The stock is now diluted to about 1 per cent; then given a coarse screening to remove pins, clips, string, etc.; next thickened to 4 per cent and then passed through a refiner to separate any fibers still matted together. Now it is again diluted to 1 per cent, and then riffled and washed over a series of cylinder washers where the ink is removed. Following the washing operation, the pulp is bleached at 4 per cent consistency and then screened, preferably on flat screens equipped with .008 in. cut plates and a drag scraper at the end of the screen line. It is then re-washed over two thickeners in series, and stored in laps or slush form for paper processing.

Preliminary treatment of stock in a high density pulper and low density high speed circulating system is the same as for the system just described, but sometimes no chemicals are added in the pulpers. Stock discharged from the pulpers, after dilution, goes to one or more vertical cylindrical tanks, each with a cone bottom to which is attached a pump which rapidly circulates the stock in the tank until deinking is completed. Sometimes the pump discharges at high pressure against a target to quicken the defibering action. This system with plain circulation, using caustic soda and 180 deg. Fahr. temperature, requires one to two hours pumping at 7 per cent consistency. After the stock is deinked it goes to a storage tank and is then riffled, washed, bleached, screened, and re-washed.

The rotary cooker system with refiner is the old system of rotary boilers already described with the addition of a modern method of washing and screening. After the pulp comes from a rotary, it is beaten or refined to separate the individual fibers previous to washing and screening.

Probably the most common system in operation today, especially on large tonnages, is the low-density, high-speed circulating system. Two general methods are employed for making this system effective.

In the first, sorted paper goes directly into a continuous breaker beater in which caustic and steam are added, the temperature being raised to 100 deg. Fahr. An extractor removes the stock which is fine enough to pass a 1-½-in. diam. hole and this stock is pumped at 7 per cent consistency to a storage tank. The pulp then goes to a series of vertical cylindrical tanks with cone bottoms equipped with circulating pumps and in which the temperature is brought up to 180 deg. Fahr.

Three to four hours' circulation is required in these tanks to properly defiber the stock. About 3-6 per cent

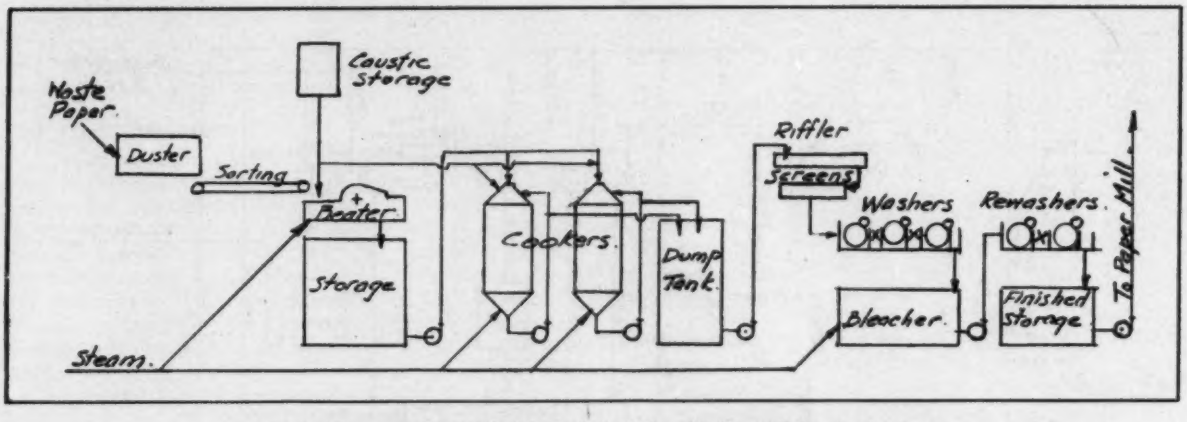


Fig. 2—Diagrammatic sketch of vertical circulating deinkers with breaker beater.

caustic soda is used on book and magazine stock. By using a target, and a pump giving 100 lb. pressure, actual pumping time is reduced to about 1½ hours. An efficient low head circulating pump discharging into a hammer mill located above the tanks will take about the same time. The washing and bleaching procedure is the same as that already described. Figure 2 shows the arrangement.

In the second system of this type, the vertical tanks are partly filled with hot water and caustic soda. The pumps are then started, and dry shredded waste paper is fed into the tanks from overhead bins until a consistency of 8-10 per cent is obtained in each of them. The mass in each tank is circulated with an inefficient pump which aids disintegration. This method of treatment takes 3-5 hours depending on the stock being handled. Stock temperature is maintained at 200 deg. Fahr.

Licensed Systems

There are a number of licensed deinking systems. One company has the *Oxford Pulp Process* for deinking waste paper made from chemical pulp, and the *Sterling Process* for newspapers. A royalty is charged on the basis of the tonnage of waste paper used. The chemicals employed are kept secret. In the Oxford Process, the paper after dusting is put in a pulper of special design along with the chemicals, and from there it is delivered to a storage chest. From the storage chest it goes to a high density filter where part of the chemicals are recovered. It then goes through a refiner. After refining, it is screened and washed on a three-stage washer. It is then bleached and re-washed.

The Sterling Process uses the same equipment as the Oxford Process. Deinking takes place at low temperature, and a special bleaching agent is used so as not to discolor groundwood, as would be the case if hypochlorite bleach were used.

Another process is the *Snyder-Maclaren Process,* in which royalty is again charged on the tonnage of waste paper used. The equipment used in this process is the same as outlined under the high density pulper and refiner system. This process is protected by patents on the use of certain wetting agents and detergents. The agents being employed are Duponol, or Gardinol, in conjunction with silicate of soda. It is claimed that groundwood can be deinked successfully, by using proper chemicals in deinking and bleaching, and by keeping the temperature low.

Then there is the *Hochstetter* or *Silco Process* which likewise charges a royalty for waste paper used, and employs secret chemicals. This system is claimed to handle groundwood, as well as chemical pulp papers, and uses special equipment to carry out the deinking and bleaching.

Comparison of Systems

The following figures on steam and power requirements permit the merits of the several systems to be compared:

	Deinking Steam. Pounds per ton	Shredding and Defibering. Power kw. hr. per ton
Pulper and Refiner..	1500	120
Pulper and Circulating System	6000	90
Rotary Boiler	2500	57
Circulating System		
1) With breaker beater and target	6000	102
2) Dry feed-pump circulation	6000	137
Winestock System ..	5000	109
Cooking Engines	6000	144

These figures are estimates checked in most cases with actual operations, covering a number of installations. They do not include steam for bleaching or the power for sorting, washing, screening, bleaching and re-washing, as these figures can be the same.

Two other items of consequence in conversion costs are chemicals and labor. In general, the former should be less where deinking is carried on at

Comparative Operating Data For Eleven Deinking Plants

Kind of System*	1	2	3	4	5	6	7	8	9	10	11
Paper cooked, tons per day	45	45	53.15	10.50	103	35	55.34	62	14.70	50	12
Dry weight per cooker—lbs	3,000	2,500	5,600	2,100	17,150	2,300	1,729	10,000	9,390	2,500	2,000
Length of time per cooker—hours	3	2.5-3.5	3.5-4	1.75	8	5	3	4-5	8	2	1.5
Time to load (hours)	.33	.08	.67	.40	.83	.50	.50	.17	2.80	.33	.25
Time to unload (hours)	.17	.08	.33	.17	.17	.17	.17	.17	.75	.33	.25
Time to steam (hours)	1.50	.5	1.5	1.00	2.00	.25	.33	.....	4.00	1.00	no record
Steam used per ton	7,920	6,500	4,800	7,200	3,000	.....	5,370	5,200	1,280	6,000	13,200
Caustic used (per cent)	.....	4.5	.....	.....	0.1	3.0	4.6	5.5	4.1	.....	4.
Soda Ash used (per cent)	8.0	.....	7.5	3.0	5.5	.....	3.	.....	.....	4.	8.
Kilowatt hours per ton paper cooked	40	111	94	122	104	.....	90	112	192	40	195
Shrinkage (per cent)	29.8	30.35	25.28	26	23.7	22	41.60	22-30	20	30	.....

*Numbers one through eleven are circulating systems for deinking, with the exception of No. 7 which has beaters, and No. 9 rotary boilers.

high consistency. Labor cost depends largely on the size of the system and the mechanical arrangement.

The accompanying table gives comparative data on eleven installations (*4*). Nine of these installations are circulating systems; one, beaters; and one, rotary boilers. These data show the wide variation in operations even for similar systems.

Losses

The amount of alkali used in deinking is far in excess of that required to loosen up the ink. Years ago some mills recovered and re-used some of this alkali, but this practice seems to have been given up by a large number.

A careful check (*5*) on the amount of soda ash actually consumed in the open tank deinking process revealed that it amounted to 1.5 per cent on the basis of the weight of paper treated. In other words, of the 6-2/3 per cent actually used, only 1.5 per cent was for deinking proper. The balance represents chemical held in the stock before washing, and which is partly an uncontrollable loss.

Coughlin also made a theoretical calculation of the amount of soda ash required in deinking coated book papers. In making this calculation, he figured the amount used in the chemical reactions with sizing, casein, ink, free alum and colors. The total was 2 per cent of the paper weight, which checks fairly well with the figure already given. As only 22½-30 per cent of the chemical used was actually required for deinking proper, some attention might profitably be paid to the problem of liquor recovery.

In a number of mills, part of the excess alkali is removed by using screw presses. If the pulp is fed in at 7 per cent consistency, and leaves at 30 per cent, then about 75 per cent of the liquor is removed. By re-using this liquor, heat is also recovered.

In circulating systems where deinking takes place at low consistencies, the heat loss is a considerable item. One mill has installed a flash system to recover part of this heat.

Shrinkage

The washing operation is carried on to remove ink from the defibered pulp. Numerous arrangements are in use, all based on holding back the fibers by means of a wire mesh screen, and allowing the water to run out carrying the ink and filler along. As the ink is not all removed in one operation, the operation is repeated. The most common arrangement, but perhaps not the best, is a series of cylinder washers equipped with couch rolls and with agitator tanks between. Water is conserved with counter-current washing.

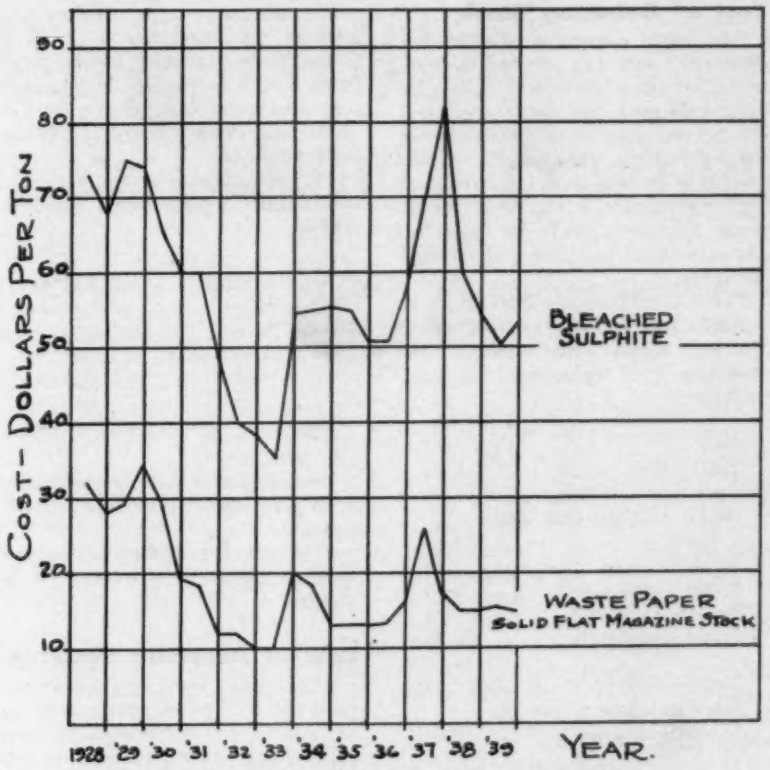


Fig. 3—Chart showing six-month average prices 1928-1939. Sulphite and magazine stock F.O.B. New York. (From *Paper Trade Journal*, compiled by G. Teren.)

The shrinkage in deinking is chiefly in the washing operation. This shrinkage ordinarily is 8-10 per cent on ledger stock, which is largely sizing and filler; and 20-35 per cent on book and magazine stock, depending on the amount of filler and short fibered pulp used. If heavily coated papers only are used, the shrinkage might be 40 to 60 per cent. There is also a shrinkage figure due to rejects in sorting which varies with the quality of sorted paper received.

Some attempt, in time, will be made to recover the filler. This problem is a difficult one on account of the carbon and other impurities in the effluent.

Bleaching

On better grades of paper it is generally found desirable to reduce the grey cast found in some deinked stocks. Sometimes this reduction is accomplished by adding color, but more generally by bleaching. The amount of bleach required is small—from ½ to 1 per cent of chlorine.

The usual procedure is to add calcium hypochlorite to the pulp after it has been washed. The bleach is allowed to react one to three hours, but this time can be shortened by heating the stock at about 5 per cent consistency to 80-100 deg. Fahr.

Screening

If clean stock is desired, screening is of great importance. Just as flat screens are the best for virgin pulp, so they are best for reclaimed stock. A 12-plate screen with .008 in. cut plates is good for about 20 tons in 24 hours. Where tonnage requires it, three such screens may be placed in series with a pitch of 3 in. per screen. These screens should be kept flooded; and the last section should be provided with an automatic scraper. If the stock is properly deinked and riffled, the rejects should be less than 1 per cent. The screens will do a better job, and keep cleaner if they are placed after bleaching.

Beating or Refining

It must be remembered that waste paper stock received a proper beating or refining treatment in the original manufacture of the paper; also that the fibers are separated in the deinking operation. Therefore a severe beating action on waste paper will injure the fibers. To prevent such injury, this stock should be mixed with whatever new pulp is used *after* the latter has been separately refined.

Any final treatment required to get the proper sheet characteristics on the paper machine can be given in the machine jordan or refiner.

Cost of Deinking Stock

The cost of conversion will vary between $10 and $15 per ton deinked stock including overhead, depending on process used, tonnage handled, etc. To this cost must be added the cost of the waste paper, including the proper allowance for shrinkage. In considering comparative costs, with virgin stock, allowance should be made for the expense of slushing and refining the latter.

The costs of deinking ledger stock in a small rotary cooker system using washing engines for washing and bleaching, as of September, 1939, were as follows:

Item	*Cost per ton*
Total labor	$ 4.29
7 per cent Soda Ash	2.60
Bleach (0.8 per cent chlorine)	1.50
Sulphuric Acid	.24
Steam (approx.)	1.50
Repairs (approx.)	.50
Power (approx.)	.75
Total Conversion	$11.38
Stock including 15 per cent total shrinkage	39.00
Total Cost	$50.38

The cost of deinking book stock, as of September 1, 1939, by a circulating system, the stock being put in slush form before going to the circulating tanks, was as follows:

Item	*Cost per ton of deinked stock*
Labor	$ 3.57
Caustic—5½ per cent	2.20
Bleach	.75
Steam	3.90
Repairs	.80
Power	2.00
Miscellaneous	.28
Total Conversion	$13.50
Magazine Stock, including shrinkage	24.00
Total Cost	$37.50

Figure 3 shows fluctuation in the cost of waste papers (magazine stock) and bleached sulphite. This chart gives an idea of the relative costs over a fairly long period, and shows the way waste paper will follow the price trend of pulp.

Amount of Waste Paper Available

The total paper production in the U. S. in 1939 was 13,441,000 tons.

The total waste paper re-used in U. S. in 1939 was 4,500,000 tons.

The amount of paper destroyed in 1939 was 8,941,000 tons.

The paperboard mills are the greatest users of waste paper. In 1939, they consumed 4,000,000 tons.

The production of board in 1939 was 6,100,000 tons.

The production of papers in 1939 in which deinked waste paper could be used was:

Writing paper	612,000 tons
Cover paper	21,500 tons
Book paper	1,377,000 tons
Book paper coated	290,000 tons
Tissue paper	627,000 tons
Total	2,927,500 tons

The amount of waste paper used in these grades was approximately 500,000 tons.

It is evident that there is plenty of waste paper available to meet the demand.

Cost of Deinking Systems

The cost of a deinking plant will depend on the type of system installed, its capacity, and the amount of waste paper storage space provided. In general, a complete plant including buildings and moderate storage will cost between $2,000 and $4,000 per ton. This figure may be compared to the cost of a chemical pulp mill, which would, including bleaching, amount to from $15,000 to $30,000 per ton.

The low capital investment required plus the lower cost product which can be obtained should make it worth while for many mills to consider the advisability of such a system.

Advantages of deinked stock in paper furnish

1) Can improve bulk, opacity and strength

2) Sheet is softer, but, if this is undesirable, sizing can be used to give the desired rattle

3) Formation is generally better

4) Book papers made partly from deinked stock have a higher retention of size and loading materials

5) Cost is considerably less than new pulp

6) The large amount of papers made with deinked stock in itself endorses its wider use.

Acknowledgement: The author wishes to acknowledge data obtained from E. T. A. Coughlin, and to thank him for his kindness in going over the manuscript.

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SIZE OF PORES IN PAPER

▶▶▶ MANY WORKERS have been interested in determining the size of the pores, or tiny passages through paper, and have expended considerable effort in trying to measure their size. Such knowledge is valuable in problems involving the saturation of paper with liquids, in the use of filtering media, in the study of volumetric composition, in the design of paper for particular uses, and in other problems requiring a knowledge of the structure of paper.

The methods most used in attempting to measure the size of the pores in paper are of three general types: (a) those depending upon a measurement of the rate of efflux of fluids; (b) those depending upon a measurement of the rate of rise of liquids in vertical strips of paper; and (c) those depending upon a measurement of the capillary pressure involved in the penetration of paper by liquids.

A new method has been developed in the Paper Section of the National Bureau of Standards by F. T. Carson, which is described in the April issue of the Bureau's *Journal of Research*. This method takes advantage of the fact that the friction between a gas and the walls of a capillary tube through which it flows varies with the pressure of the gas. A well-known theoretical equation designed to describe the flow of a gas through a capillary tube is used in formulating an expression for the average effective radius of the pores in a sheet of paper, in terms of the air permeability at different pressures. With this method, therefore, it is only necessary to determine the air permeability accurately at two different pressures, in order to calculate the size of the pores. Means of accurately measuring the air permeability of paper have previously been described by the National Bureau of Standards.

The report describing the new method includes experimental data on five papers, together with the calculated value of the average effective pore radius in each case. The values are in the neighborhood of a thousandth of a millimeter.

Responsibility of a Foreman in a Plant Safety Program

V. C. GAULT, Personnel Supervisor
Crown Zellerbach Corporation (Crown Willamette, Camas Div.)

▸▸▸ A STUDY OF THIS SUBJECT first leads to a concept of the terms *Responsibility, Foremen* and *Plant Safety* as we consider them in our day by day association with certain problems.

Responsibility is that particular part of a foreman's function which obligates him to render to his immediate supervisor certain definite services in the most efficient and wholehearted manner conceivable.

A Foreman is any employee to whom is delegated the responsibility of guiding, instructing and developing other employees in their association with one another, so that they may render efficient services in the common cause of operating a plant in the manner necessary to insure continuity of operation, continuity of employment and continuity of dividends.

Plant Safety is that part of plant operation which insures against hazards of all kinds, the physical property of the company and the physical well being of all employees. Under this very important heading comes fire protection, storm protection, electrical and mechanical protection and, above all, human protection.

This article is confined to a discussion of methods employed in human protection, or to use a more familiar term, accident prevention, as carried on by the Crown Willamette (Camas) Division of Crown Zellerbach Corporation.

Safeguards around moving machinery, walkways, electrical apparatus, etc., plus overload release devices on steam boilers and air receivers long have been required by statute, and Crown Zellerbach has provided and continues to provide such safeguards as everyday experiences point out as being helpful to protect employees.

Safeguards alone cannot accomplish the purpose in the campaign to see that not one single employee suffers injury. In fact, man failure far outranks guard or equipment failure as the factor which keeps us from our goal.

The management recognizes its responsibility for the progress made in any branch of its endeavor, but relies upon its supervisors and foremen to meet and solve all problems that develop in their respective departments. Through the Safety Supervisor and personal contacts, management keeps very close to and gives valuable aid in our struggle to combat "man failure."

The supervisors and foremen recognize their responsibility and devote much of their thought and attention to this great problem.

Each foreman or sub-foreman accepts a new man from the employment department, and the very first thing he does is to point out to the man all the hazards of the particular job to which the man is assigned and, in a firm but kindly manner, explain to him that the responsibility for his own personal safety and much of the time for his fellow employee rests squarely on his own shoulders. He asks the employee to assume this responsibility, feeling that it will make for "safety consciousness" from the very outset. A definition coined by one of this company's supervisors, so axiomatic that it has been almost worn threadbare, is the following: *"An accident means that someone has failed to recognize his responsibility for his own or someone else's personal safety."*

Although the foreman places this responsibility on the individual, he does by no means shirk his responsibility toward each one of the individuals who make up his group. He is constantly—and this means daily—talking to his men one by one or in groups, trying to keep the thought of safety uppermost in their minds. Group and departmental meetings are held (conducted by the foremen or sub-foremen themselves) not at stated times, but at any time items of mutual interest can be discussed which will tend to unite them as a group in this effort to eliminate all accidents.

There are over 90 supervisors, foremen and sub-foremen in the Camas plant. Regular and special meetings of foremen take up the subject of accident prevention and delve into the causes of accidents, both slight and disabling. They discuss near accidents, reports from other plants in the industry, see motion pictures, listen to men from other plants who often bring new ideas well worth while.

Each foreman selects one or more employees to assist him in the safety work in his particular department, and these safety committeemen represent the foreman and the employees of the department at the regular meetings of the general safety committee held every other week.

These men also take part in the investigation of every accident occurring in their department. These investigations are made by the Safety Supervisor and departmental foremen who call from three to five other employees to assist and render a written report setting forth the true facts, fix the responsibility for the accident and make recommendation for the prevention of the recurrence of such an accident.

No attempt is made to punish an employee who sustains an injury, for it is felt that he has suffered enough, but by pointing out exactly what caused the accident, unsafe conditions may be corrected or the manner in which "man failure" operated as a cause can be brought to the attention of all other employees in order to increase their "safety mindedness."

Over seven hundred employees have taken (voluntarily) first aid training during the past ten years. This is felt to be very valuable in keeping people safety minded and the interest developed through competition of trained first aid teams goes far in sustaining the right kind of thinking while on the job. Here again the foremen (voluntarily) have set the example by taking the training themselves and actively support the continued effort to provide this training.

Good housekeeping is recognized as playing a most important part in preventing accidents. Again "Responsibility" plays its part. The fact that our plant is one of the cleanest and best kept in the country is due to the part foremen have played in accepting responsibility for appearance and orderliness of their own department, and have in turn pursuaded their men to accept responsibility for maintaining the area in which they work in the best possible condition.

Unquestionably, wet, slick floors, accumulations of rubbish, tools and equipment in disorder are responsible for a

(*Concluded on page* 923)

Brown Mechanical Pulp from Yellow Birch

MYRON KIN[1] and C. E. LIBBY[2]

An abstract of a thesis submitted in partial fulfillment of the requirements of the New York State College of Forestry, Syracuse, New York, for the degree of Master of Science in 1938. Literature citations of work done after that date are not included.

PART II—EXPERIMENTAL

WOOD

YELLOW BIRCH (*Betula lutea*), chosen for investigation in this work, was obtained on property owned by the New York State College of Forestry near Wanakena, New York. The wood was cut from trees growing on sloping ground and was part of thinning operations then in progress. The wood was brought to the College in four-foot bolts, unbarked, and selected from sound, main trunks of the trees.

The wood was evaluated according to the standard method of TAPPI (T-7). The average diameter of the logs was 5.82 inches, ranging from 4 to 11 inches. Additional data obtained were as follows:

Age—22.2 years
Heartwood—9.9 per cent
Average rate of growth—0.26 inches per year
Density—55.3 pounds per cubic foot when green
43.7 pounds per cubic foot when oven-dry

The wood contained on the average 37.8 per cent moisture.

The evaulated wood was finally barked by hand and stored indoors. Part of the wood was cut with a swing saw into eight-inch bolts preparatory for cooking. Moisture and the oven-dry weight were determined by means of sample discs cut from the center portions of the bolts. These discs were dried for not less than 48 hours at 150 deg. C. to constant weight.

As the wood seasoned and the new bolts were cut into the desired lengths, similar additional moisture determinations were made. After the wood had seasoned for a month, all subsequent moisture determinations did not vary more than a few per cent. The moisture content of the wood, however, was checked each time the wood was cut into eight-inch bolts.

Treatment of Wood

1) Digester

The upright digester (Figure 1) chosen for pretreating the wood was lead-lined and easily convertible so that it was adaptable for boiling or steaming. The inside dimensions were 11 inches in diameter by 30 inches deep. The digester was made from a standard 12-inch iron pipe with two circular concentric flanges welded on each end. The entire inside of the digester, the fixed bottom cover and the removable top cover, were lined with lead. The outside of the digester was coated with ¾-inch thick asbestos heat insulating material. A thermometer-well extended into the digester for temperature readings. The heating system of the digester was so arranged that either direct or indirect steaming could be used. In the bottom of the digester was coiled about 30 feet of ¼-inch copper tubing, leading to the steam inlet-pipe through a reducing valve. Another connection from the steam supply to the top of the digester permitted direct steaming. In this way, by use of the copper heating coil, the temperature and pressure desired could be maintained without having any condensate building up in the digester. In the boiling, the temperature could be regulated to within one degree by use of the indirect heating system. In steaming wood, a small volume of water was heated into steam of the desired pressure. In this way, no higher pressure steam than that pressure desired came in contact with the wood. On top of the heating coil was placed a coil of loose pipe to protect the wood from coming into contact with the steam coils.

Pressure readings were obtained from a pressure gauge attached to the upper portion of the digester. Temperature was controlled by means of readings from a thermometer placed in an oil-filled thermometer well.

In the first few boiling tests, a cold-water condenser was used to condense the escaping steam. This condenser was found to be very cumbersome and undesirable, especially in the tests with zinc hydrosulphite. So in all later boiling cooks, the digester cover was bolted on lightly and the contents boiled at 0 pounds gauge pressure.

Several cooks were made in a stainless steel digester with a volume of one cubic foot. These cooks were used as checks against those made in the lead-lined digester. The stainless steel digester was indirectly heated by means of an oil heat-exchanger. This digester was also equipped with a pressure gauge and thermometer well. The liquor from the digester was circulated through a screened bottom by means of a pump, then through the oil-heat exchanger and reintroduced at the top of the digester. Control of temperature could be regulated to within a degree of the desired temperature.

2) Boiling

In all the boiling experiments, the wood was weighed air-dry and from the moisture determination the oven-dry weight could be determined. The wood was covered with water and the added volume was noted. The cold-water condenser, or the cover, was put on and the steam to the copper heating coil was turned on full force. The digester contents were brought up to the desired temperature (100 deg. C.) within 15 minutes. The pet-cock in the cover of the digester was opened as the digester was brought up to temperature to allow any trapped air to escape. Then the steam was cut down to maintain the digester contents at this temperature. The digester was inspected at frequent intervals to see that no pressure was built up and that not too much evapora-

(1) Research chemist, Cellulose Products Division, Dow Chemical Company, Midland, Michigan.
(2) Professor of Pulp and Paper Manufacture, New York State College of Forestry, Syracuse, New York.

tion took place. The wood was boiled from 5 to 20 hours. At the end of the cook, the steam was shut off and the digester allowed to cool for a short time. The liquor extract was then removed through a valve set in the bottom of the digester. The wood was then washed with a small amount of water and combined with the liquor extract. This total volume was then measured accurately and set aside for analysis.

The wood, upon removal from the digester, was weighed accurately to the nearest gram, and several sample discs were cut from moisture determinations. The wood was then tagged and allowed to air-dry.

In this series of boiling experiments, cooks were made for 5, 10, 15, and 20 hours at 0 pounds gauge pressure.

3) Steaming

The wood was weighed just as in the boiling experiments, but instead of covering the wood with water, about 3-5 liters of water were placed in the digester and the covers bolted on tightly, using pulp for gaskets. The steam was then allowed to flow full pressure into the copper heating coils and, when the temperature reached about 90-95 deg. C. the pet-cock was opened to allow the trapped air to escape. The steam was adjusted so as to maintain the desired pressure.

Cooks were made for 5, 10, 15, and 20 hours at 25 and 50 pounds gauge pressure. In the 50 pound cooks, it was necessary to put in seven litres of water and allow some direct steam to enter the digester at certain intervals, especially in the longer cooks.

Upon completion of the cook, a copper cooling coil was used to blow the digester. This coil was immersed in a pail containing running cold water. The copper coil was attached to the discharge valve and the valve opened. The liquor condensate and vapors were cooled and allowed to collect in a pail. In practically all of the steaming cooks, especially in the 50-pound series, a burnt sugar odor was noticed. At the initial discharge, it had a pleasant caramel odor, which changed to a nauseating odor as the blowing progressed. The cover was then removed and the contents of the digester were washed with water and the wash water collected with the condensate extract. The volume of this extract was measured, labelled and set aside for analysis. The wood was removed, weighed as in the boiling experiments, and the sample discs were cut for moisture determinations. The wood was then labelled as to the number of cook and set aside to air-dry.

4) Cooking with Chemicals

A. Boiling: In cook No. 4, sulphite liquor with a calcium base was added. The amount of total sulphur dioxide added was based on the oven-dry weight of the wood. The sulphite liquor was analyzed volumetrically as specified in the TAPPI Standard Method (T-604). The correct volume of liquor was furnished to give the desired amount of sulphur dioxide, and enough water added to cover the wood in the digester. The same procedure as outlined under *Boiling* was followed as to cooking, blowing, and weighing the cooked wood. A pleasant caramel odor was noticed on blowing. No odor of sulphur dioxide was detected in either the liquor or the wood.

In boiling with zinc hydrosulphite, the chemical was added as a dry powder to the digester already charged with wood. The wood was then covered with water and the condenser or cover put on. When using the cold-water condenser, odors of sulphur dioxide and hydrogen sulphide were detected in the relief. The zinc hydrosulphite is evidently unstable at high temperatures. When using the cold-water condenser, the wood on discharge was coated with a white to greyish substance. However, when using the digester

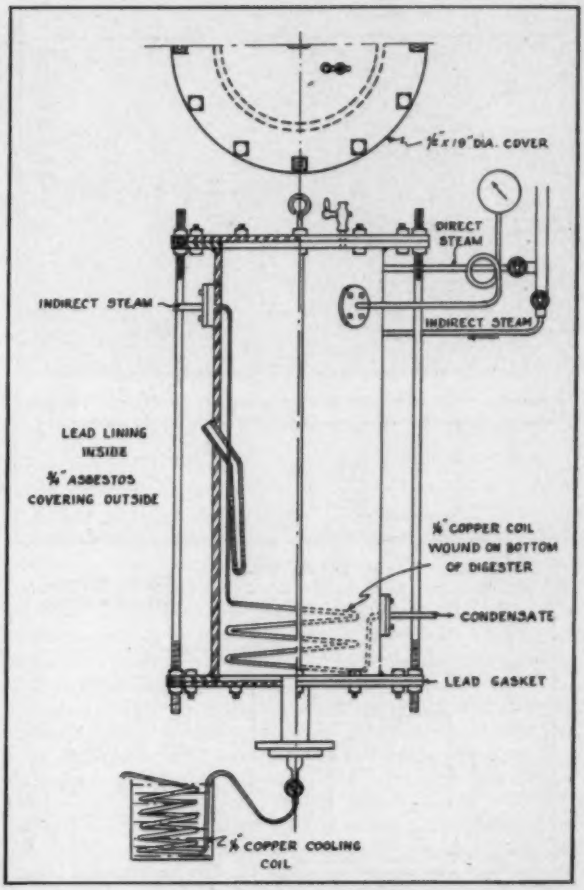


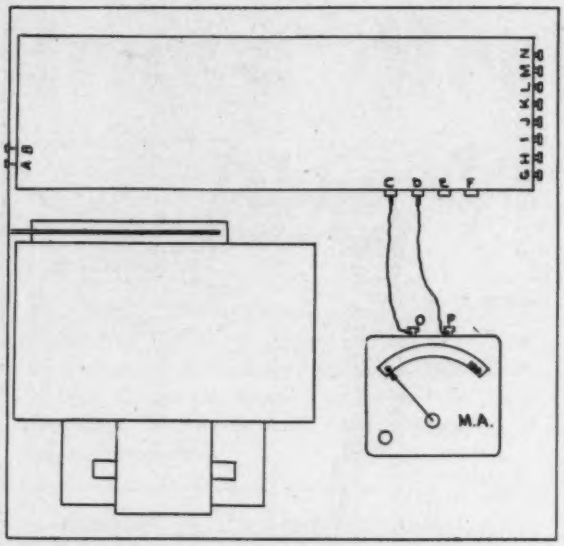
Fig. 1—Lead-lined digester.

cover no such coating resulted. Evidently, the vapors and gas during the cook condensed on the iron cold-water condenser, reacted with the iron, and then dropped back into the digester, coating the wood with some iron—or zinc sulphur compound. This greyish color penetrated only a short distance into the wood.

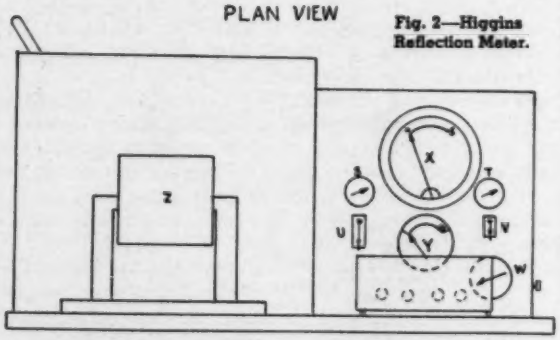
Collection of the liquor extracts and weighing of the wood were carried out exactly as in the boiling experiments.

In the cook using sodium metasilicate, a commercial brand was used. Four per cent of this liquid silicate, calculated on the oven-dry weight of the wood, was added and the boiling procedure followed as in the other boiling cooks.

B. Steaming: In cook No. 3, sulphur dioxide gas was used as the chemical. The gas, sulphur dioxide, was passed from a tank through cold water until a considerable quantity dissolved. This solution was analyzed and a volume of this liquor was added having a sulphur dioxide content equivalent to five per cent of the weight of the oven-dry wood. Enough water was added to bring up the volume to five litres. From this point, the procedure followed was similar to the steaming cooks under the same pressure conditions. On blowing this cook, a fairly strong odor of sulphur dioxide could still be noted. The liquor extract gave off a pleasant caramel odor in addition to the characteristic odor of sulphur dioxide. The wood from this cook was a very dark mahogany color throughout. Small pieces of the treated wood crumpled when crushed between the fingers. Evidently extensive pulping took place. The wood was also being burned by the sulphuric acid formed during the cooking process. The wood itself was saturated with the sulphur dioxide gas, for the odor could be detected even after stand-



PLAN VIEW



FRONT ELEVATION SCALE ~ $\frac{1}{4}$" : 1"

Fig. 2—Higgins Reflection Meter.

ing in the open for a month. The dark reddish color of the wood was evidently due to the burning by the sulphuric acid formed. It was thought, therefore, that, if a base were present and the amount of sulphur dioxide added was reduced, the softening of the wood could still be obtained without the accompanying dark color.

In cooks No. 8 and No. 9, ammonia gas was added with the sulphur dioxide, and the wood steamed. Ammonia was added in the form of ammonium hydroxide (NH_4OH). In cook No. 8, 0.5 per cent of ammonia and one per cent of sulphur dioxide on the weight of oven-dry wood were added. A slight trace of sulphur dioxide was noticed in the steamed wood. No ammonia could be detected at any time. In cook No. 9, therefore, the amounts were doubled, but still no odor of sulphur dioxide or ammonia could be detected in either the wood or the liquor extract.

ANALYSIS OF LIQUOR EXTRACT

Total Solids and Ash

The liquor extract was allowed to stand for a short time to allow the heavier grit particles to settle to the bottom. Several 100 cc. samples were pipetted out and evaporated in tared crucibles over a hot plate to approximately 50 cc. Then the samples were placed in an oven over night until perfectly dry. The crucibles were weighed and the amount of total solids in 100 cc. of the liquor extract was determined by the following formula:

$$\frac{\text{wt. total solids} \times \text{vol. liquor extract} \times 100}{\text{wt. of wood} \times \text{vol. of sample}} = \text{per cent of total solids}$$

The same crucibles were then placed in a muffle furnace for one hour, cooled and weighed again. A formula similar to the one above was used, except for the substitution of the weight of ash in place of the weight of total solids.

Tannins

The American Leather Chemists Association Method (*17*) was used for the determination of tannins.

Soluble Solids: The kaolin (china clay) that was used had been digested with hydrochloric acid, washed with distilled water, and dried.

To one gram of kaolin in a beaker was added sufficient liquor extract to fill a filter paper 15 cm. in diameter. This amount of extract was pre-determined by actual measure. The mixture of extract and kaolin was stirred and then poured on the paper. When approximately 25 cc. of filtrate had been collected, the filtrate was returned to the filter paper together with as much kaolin as could be conveniently transferred from beaker to paper. This operation of using renewed filtrates for transferring all of the kaolin required one hour, at the end of which time the entire amount of kaolin was transferred from the beaker to the filter paper. At the end of the hour the solution was removed from the paper and the kaolin disturbed as little as possible during this operation. Somewhat more than 200 cc. liquor extract were brought to exactly 20 deg. C. and the filter paper filled with a portion of this new solution, and filtrates collected.

The filter paper was kept full at all times and the temperature of the solution in the filter was maintained between 20 deg. and 25 deg. C. Funnels and beakers were covered during the filtration. Two 100 cc. of the clear filtrate was pipetted into tared evaporating dishes and placed in the oven for drying. The dried residue was weighed and calculated as per cent soluble solids on the basis of oven-dry wood, using the following formula:

$$\frac{\text{wt. of residue} \times \text{vol. L. E.} \times 100}{\text{o. d. wt. of wood} \times \text{vol. sample}} = \text{per cent of Soluble Solids}$$

Non-Tannins

The hide powder used was of a woolly texture, well delimed, and required between 12 and 13 cc. of 0.1N sodium hydroxide to neutralize 10 grams of absolutely dry powder.

(17) Wilson, *The Chemistry of Leather Manufacture* 2nd ed. Vol. 1, page 416.

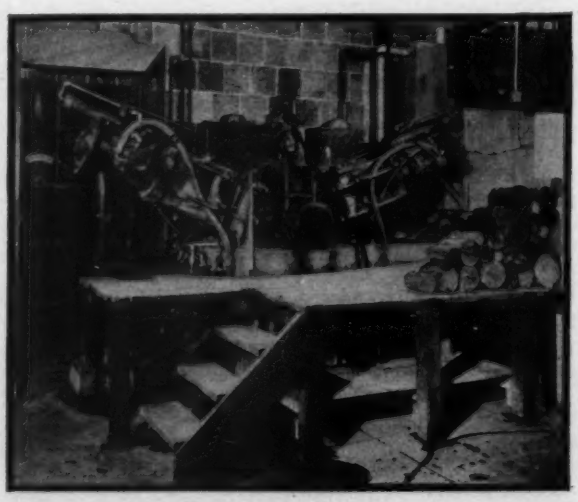


Fig. 3—Experimental Great Northern wood pulp grinder employed for pulping pretreated hardwoods.

The hide powder was digested with ten times its weight of distilled water until it was thoroughly soaked. A 3-per cent solution containing 3 per cent of chrome alum [$Cr_2(SO_4)_3K_2SO_4:24H_2O$], calculated on the weight of air-dry powder, was added to the digested hide powder. The mixture was agitated frequently for several hours and allowed to stand over night. The mixture was then squeezed through a linen cloth, and washed by digesting with four successive portions of distilled water, squeezed each time to approximately 75 per cent water, except after the last digestion. Enough hide powder was prepared to make eight determinations, and was used within several days.

To a quantity of wet hide which corresponds to 12.5 grams (not less than 12.2 nor more than 12.8 grams) of absolutely dry hide powder, 200 cc. of liquor extract were added in a bottle and the mixture shaken for 10 minutes. The mixture was squeezed immediately through linen, and two grams of kaolin were added to the detannized solution, and thoroughly stirred. This mixture was filtered into a tared evaporating dish through a single-folded filter paper (24 cm.) which held the entire filtrate. The filtrate was evaporated and dried in an oven at 100-110 deg. C. The non-tannins were calculated by a formula similar to that used in calculating soluble solids.

The per cent tannins were obtained by the following formula:

Tannins = Soluble Solids — Non-Tannins

Other Constituents

It was attempted also to analyze the liquor extract for total and volatile acids, furfural, reducing sugars, and methyl alcohol, but the results proved to be so inconsistent that it was deemed advisable to omit the findings relating to the above constituents.

DETERMINATION OF COLOR OF WOOD SAMPLES

The treated wood after having been air-dried was cut into discs on a band saw. Two bolts from each cook were chosen. At least five pieces were cut, in both radial, tangential, and cross-section. After several determinations were made, the cross section samples were discarded since the variation in the heartwood area affected the readings considerably.

The color readings were taken on the Higgins' Photoelectric Colorimeter (Figure 2) using standard Wratten filters. Eight Wratten filters covered the visible color range

Fig. 4—General view of pulp testing laboratory showing strength testing equipment employed in this investigation.

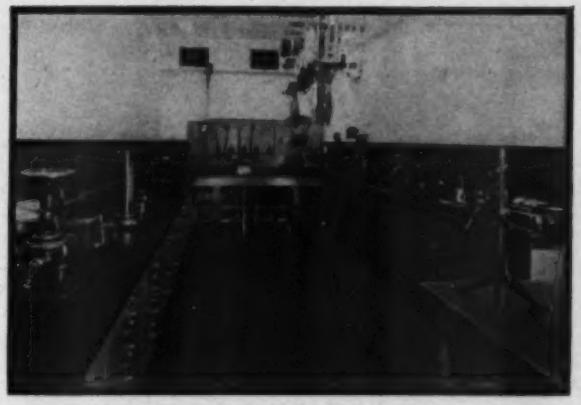


Fig. 5—General view of paper testing laboratory where physical tests were made on papers produced from hardwood pulps.

from 400 mμ to 700 mμ wave length with a 30 to 50 mμ range between each.

Before each test, the Higgins' Colorimeter was turned on and allowed to warm up for about 30 minutes. The voltage of the instrument was held as near six volts as possible, and never allowed to go below 5.6 volts. The milliammeter was adjusted to 1.5 with the coarse adjustment switch (S). The microammeter was then put into operation by closing the knife switch (V). The lamps (3—15 candlepower bulbs) are mounted at angles so that the light will be reflected toward the sample opening. The bulbs are set behind a frosted glass to diffuse the light, which is reflected by concave polished reflectors. The color filter was then put in place in a sliding holder and adjusted until in direct line between the sample and the photoelectric cell.

With the black standard (black velvet cloth lining) over the opening, the microammeter key was pushed down and the reading adjusted by 0 by means of the fine adjustment switch (T) on the right of the instrument panel. Then with the white magnesium carbonate standard over the opening, the aperture was adjusted by means of the lever (R) to give a reading of 98. Several readings were taken of the white standard for each filter, the reading for the black body and the 98 reading of the magnesium carbonate black being checked before and after each reading of the white standard. In this way, the filters were standardized with the white standard surface and the standard magnesium carbonate block. At frequent intervals, the filters were rechecked especially if the batteries became low.

The following is a recapitulation of the factors and wave lengths of the Wratten filters used in the colorimetric determinations:

Milliamperes 1.06
Voltage 5.6
Standard—Magnesium Carbonate Block.....98

Wratten Filter	Factor-White Body	Wave Length in Millimicrons
76	79.3	430
50	76.5	460
75	76.5	490
74	79.0	530
73	79.2	540
72	78.3	610
71A	77.5	650
70	77.8	700
49	77.2	400-500 Brightness

The procedure followed in determining the color curve for each wood was to warm up the instrument for at least 30 minutes, or until the microammeter had steadied down, each time before using. The filter of lowest wave length was then placed in the holder and adjusted in place. The

black body reading was adjusted to 0 and the white body reading to the factor obtained in standardizing the filters against the magnesium carbonate block. The wood samples were then placed over the opening and the readings taken. After each reading, both the black and white body readings were checked. Readings were then obtained for each filter in a similar manner. In this way, readings were obtained over the entire visible spectral range and color curves were drawn for each set of treated wood. Several different pieces from two bolts from each cook were tested, and the average reading recorded.

The readings obtained in the above described manner give only comparative results since it is very difficult to duplicate the surface each time with the band saw. An integrating tube would have given more accurate results. However, the wood samples were cut on the same band saw and average readings were taken from at least five different samples so the results can be considered comparative.

The samples were allowed to stand in the air for a month and were again tested, in the meantime being protected from dirt. No appreciable change was noted in the color curves.

TREATMENT OF WOOD FOR GRINDING

In order to get sufficient wood to make a grinder run, several cooks of each had to be made. In this way also, checks could be run on the power consumption of separate cooks made under the same conditions since the wood from each cook was ground separately.

It was thought that since only a limited number of grinding tests could be made, these tests would be limited to runs after treatments by boiling, steaming, boiling with two per cent zinc hydrosulphite and grinding untreated woods.

In each grinder test, the untreated wood was weighed air-dry and allowed to soak overnight. The oven-dry weight of the wood was determined from the moisture determination.

In the first series of cooks for grinding, three cooks were made, all running for five hours. Immediately after cooking the wood was weighed, moisture determined, marked for identification and placed under water until ready for grinding.

The boiling cooks, both with and without the two per cent zinc hydrosulphite, which was based on the oven-dry weight of the wood, was made at 100 deg. C and 0 pounds gauge pressure. The wood was ground within three days after having been treated.

In the second group of tests, the first series of cooks was repeated since the grinding conditions were changed.

In the third series, the cooking conditions were identical with the first series except that all cooks were for 10 hours duration. Spruce wood was ground in this series also, the weight being determined from the volume of wood ground and the specific density of the wood as determined by senior students in their pulp evaluation of the spruce wood.

GRINDING OF WOOD

All the grinding experiments were made on a two-pocket wood pulp grinder of the Great Northern type (Figure 3). This grinder takes a stone 32 inches in diameter, with an eleven-inch face, and has a nominal capacity of approximately one ton of pulp a day. The grinder is powered by a 250 hp. d-c. motor, with speed adjustment from 300 to 900 r.p.m. possible, corresponding to a stone peripheral speed adjustment from 2500 f.p.m. to 7500 f.p.m. The direct current for the grinder motor is provided by a 200 kw. motor generator set, motor and motor generator being located in a separate vault behind the grinder. An unusually complete set of automatic control and recording instruments is provided for the grinder, giving full control over the pit temperatures, shower water temperature, grinding pressure, grinding speed and record of the grinding power. It is of interest to note that the pockets of this grinder (although they take wood only 8 inches long) are 14 inches wide in the direction of the stone travel, thus giving a grinding length in each pocket of 14 inches, comparable to that of commercial pocket grinders. All the wood was ground on an artificial Norton stone, number 50 grit.

The grinding pressure is controlled by a reducing valve in the water line to the cylinders. During the grinding operation, the unit pressure of the wood against the stone for any given cylinder pressure varies within certain limits due to variations in size of wood bolts and changing area of contact. In this investigation, the area of contact of the wood against the stone was assumed to be the product of the length of the wood bolts and the depth of the pocket. This value represents the maximum area that could be in contact and is higher than the average area. Thus the calculated pressures of the wood against the stone will all be low values.

Two water showers are used to cool the stone and wash off the pulp. One of these is located on the top of the stone between the pockets. The other shower is located at the back of the grinder near the lower part of the stone. The lower shower is connected through a reducing valve to the recording temperature control apparatus. Steam is also connected through a reducing valve to the temperature control apparatus. When the pit temperature becomes too low, steam is injected, and when too high, cold shower water is introduced into the system.

Only one pocket was used at any time to get true uniform power consumption data. The pressure leg of the other pocket advanced much more slowly due to excessive cylinder friction.

The speed of the grinder was controlled through a rheostat and could be held practically constant at any speed.

The temperature of grinding was obtained by a recording thermometer, the bulb of which was placed in the grinder pit and attached to the inner side of the stock dam.

All grinding tests were made at 175 deg. Fahr., so that it took approximately one hour to bring the grinder stone up to the proper temperature.

The wood was placed in the compartment over the pocket and, after making sure that the pressure leg was completely back, the wood was dropped into the pocket. The pressure leg was then allowed to advance by turning on the high pressure water to the cylinder. No pulp samples were taken until the second pocket of each run had started grinding. It required at least one pocket to fill the grinder pit and force the groundwood over the dam. After the second pocket had started grinding, samples of stock were taken at regular intervals. The time for grinding each pocket was recorded. Since the amount of wood ground was known from the cook data, production figures were readily obtained. Each cook was ground separately, although the pulps were mixed. The stock was finally thoroughly mixed and consistency samples withdrawn. The grinder pit and stone and the entire bull screen were all washed thoroughly before another run was started. The consistency of grinding in per cent was calculated by dividing the oven-dry weight of pulp stock by the weight of stock suspension as taken from the pit multiplied by 100.

In the first series of grinder runs, the stone had been freshly burred with an 8-cut spiral burr, having a 1¼-inch lead. Refuse wood was ground for about 12 hours before the first run was made in order to prepare the stone surface for normal grinding conditions. A speed of 300 r.p.m. (2515 f.p.m.) was used with a temperature of 175 deg. Fahr. The cylinder pressure was 60 pounds per square inch,

this corresponding to a unit pressure of 60.6 pounds in the pocket of the grinder.

In the second series of runs, the stone was re-burred with an 8-cut spiral burr with a 1¼-inch lead. Then a No. 16 diamond burr was run over that. Finally, a Carborundum brick was used to dull the stone. The speed was raised to 400 r.p.m. (3355 f.p.m.) and the pressure lowered to 40 pounds per square inch cylinder pressure, or 40.4 pounds unit pocket pressure.

In the third series of runs, the pressure was decreased to 20 pounds per square inch cylinder pressure or 20.2 pounds unit pocket pressure, with all the other conditions the same as in the second series of runs.

Sample Calculation for One Grinder Run

No. 1—Wood boiled with 2 per cent zinc hydrosulphite.

Speed ..... 300 r.p.m.—2,515 f.p.m.
Temperature ..... 175 deg. Fahr.
Pressure ..... 60 lb./sq. in. cylinder
Pressure Unit ..... 60.6 lb. Pocket

Wood Ground

	Grams (oven-dry)
Cook No. 31	11,129
Cook No. 32	10,698
Cook No. 33	11,149
	32,976
	1,995 (slabs)
	30,981 (68.26 lb.)

Pocket	*Time*
1	120 seconds
2	220
3	221
4	177
	968 seconds (16.13 min.)

Power

Average amperes 249
Average volts 226
Watts 56,274

Horsepower input to grinders 75.4
No load horsepower 12.4
Net horsepower 63.0

$$\text{Grinding rate} = \frac{68.25 \text{ pounds}}{16.13 \text{ minute}} = \frac{4.26 \text{ lb./min.}}{3.067 \text{ tons/day}} = .72$$

Power Consumption

$$\frac{75.4 \text{ hp.}}{3.067 \text{ tons/day}} = 24.6 \text{ hp.-days/ton} \quad \text{Total}$$

$$\frac{63.0 \text{ hp.}}{3.067 \text{ tons/day}} = 20.55 \text{ hp.-days/ton} \quad \text{Net}$$

Consistency of grinding ..... 7.8 per cent.

TESTING OF GROUNDWOOD PULPS

Screening

The groundwood pulp was screened on a small diaphragm screen. The screened pulp was caught in a perforated container lined with several thicknesses of cheese cloth. The pulp was pressed, removing most of the water, then broken up and mixed thoroughly before moisture samples were taken. The pulp was stored in air-tight milk cans with a little chloroform added to preserve it.

Making and Testing Sheets

Sheets were made on the British Standard Machine according to the standard TAPPI method (T-205), and tested for basis weight, thickness, tensile strength and stretch, bursting, tearing strength, moisture, and report according to standard TAPPI methods (Figures 3 and 4).

The brightness and the color tests of the sheets were made in the same way as in the case of the wood samples. Enough sheets were taken so that the white or black body would not affect the readings.

Rod Mill

Since the groundwood pulp from the first grinder series was so weak that sheets were difficult to make, the pulp was treated in a rod mill.

An Abbe bronze mill using rubber covered rods was chosen to treat the pulp.

A 90-gram sample of oven-dry pulp was suspended in 1500 cc. of water and transferred to the bronze mill together with 29 rubber-covered rods, weighing 31,460 grams. The mill was rotated for 1050 revolutions at 70 r.p.m.

The pulp was then diluted to 30 litres (0.3 per cent consistency) and sheets were made. The sheets couched considerably better, but not much strength was imparted to the pulp by this treatment.

EDITOR'S NOTE: This article is in three parts. Part I appeared in the October issue; Part III will be published in an early issue of this magazine.

Responsibility of a Foreman

(*Continued from page 917*)

very large portion of the nation's accident toll. Unquestionably, this source can be entirely removed and great strides already have been made in this direction.

Employees can be made safety conscious and, as this consciousness illuminates the path of the workman, the shadow of man failure grows increasingly less until, as we hope, it will entirely fade from the picture of men at their tasks.

Living up to the responsibility entrusted to one, motivates foremen and employees alike to lend every effort to the cause of accident prevention and to the extent all concerned accept this responsibility, and to that extent only, will injuries to men with the consequent suffering by themselves and heir families be reduced.

$$$—THE PAPER DOLLAR—$$$

ARTHUR B. GREEN

▸▸▸ PAPER MILLS OPERATE not to make paper and paperboard, but to make dollars. This may sound like a paradox, but in *the last analysis* it is the practical way to regard the paper industry. Where paper mill executives and production men gather for important conferences, they *do* discuss the problem of how to make better paper—but the highlight is *how to make more money.*

The world today takes such economic platitudes for granted, and because this one has been accepted without question, the only method of determining whether that statement "to make dollars" serves as a sound basis of reasoning for the conduct of actual practical operations, is by the challenge of an inquisitive sense, and a consideration of all phases of the subject.

To begin with, the first step is to define the statement. What is that "last analysis?" A cost analysis is one of the most familiar and oft-consulted barometers of business. But is this dollar analysis "the last analysis?" For instance, suppose the dollar analysis is in the red. At the same time, just suppose the intelligence, co-operation, and morale of the working force is high. Should the color of the dollar analysis be considered as indicative of the future? Is it not logical to believe that some of the factors contribuing to the dollar loss can be, and may have been, brought under control through the human factor which is not revealed by the dollar analysis? Such profits are intangible and where such a situation exists, they may show up in the dollar analysis at some later time.

On the other hand, suppose the dollar analysis is found to be black, but coupled with a poor organization under an incompetent leader, may not the outlook for the future in this instance be much redder than the dollar analysis is black?

There are many other vital elements that do not show up in a dollar analysis. From a modest position as an engineer, the author frequently has been astonished by the banker who will regularly base his forecast of business exclusively on the dollar analysis, leaving what appears to some the far more telling factors quite out of his findings. His decisions will invariably be based on the very narrow scope of his dollar survey. Cases are recalled where excellent papermakers struggle for years to keep afloat mills, otherwise good. They will tell you their principal problem is an unwise financial set-up or a bad combination with other mills under a syndicate arranged by a banker on the basis of a dollar analysis. Such cases make one look forward to the time when bankers might make a broader study of the art of management.

All of these considerations lead to the conclusion that using the dollar analysis as "the last analysis" is skating on paper-thin ice.

The Accounts

The foregoing is not intended to disparage the dollar accounts. Within the necessary bounds, they do present an analysis of past experience. They give a breakdown of the sales dollar and show exactly what became of it, cent by cent. They give a sound basis of comparison as between the different experiences of the past, from which the wise administrator can separate the good from the bad and so shape his future course.

But there is one thing the dollar account cannot do. As for shaping new thoughts, it lacks the faculty of constructive imagination. Henry Ford, rated as one of the most successful, states that he believes the one most valuable thing in all industry is an idea. The books of account do not deal in ideas; the nearest they come is occasionally through suggestions that are born of a consideration of past results. But without a reflective and imaginative mind (not necessarily bound in with books of account but apart from accounts as such) no ideas would materialize. Looking at the dollar analysis alone, it has the distinct character of looking backward. It can add no impetus to the future other than that which may be wrenched from a backward look over the past.

Or again, the accounts start with the sales dollar. What *makes* sales dollars, accounts can tell only in small part. By the time the accounts are in hand, the sales dollars are old ones. What counts for the future is to determine by what measures more sales dollars may be received and how less may be pared from them to meet necessary charges. If those appropriate measures are to be found by thinking of the mill as a dollar factory and by dealing with it as such, certain consequences follow.

The Sales Dollar

If the legitimate product of the mill is not paper or paperboard, but profit dollars, the raw material is essentially the volume of sales dollars. However, if taken too seriously, that proposition brings on a fixation of ideas. The inflow of sales dollars (whether adequate or not) with which the books of account start, is more or less taken for granted. This incoming fund takes on the appearance of at least a sort of uniformity. It becomes the fund from which everybody has to be paid if the business is to live. If administrators take too much, laborers become jealous. If laborers take too much, the stockholders may be left out. Bondholders want their interest; creditors want their pay; not to mention the several reserves that good practice demands. That situation calls forth a turn of mind. Unions have it. The tenet of the union is that a working man gets his share out of the fund of sales dollars. If he doesn't, it will go to someone who is less entitled to it. It is a fight, and the best the law law has attempted as yet is to tame the fight into one of rules and a degree of civilization. The law regards it as a fight, and stands up for the rights of the belligerents.

This turn of mind seems to come directly from the mental habit of considering the mill as a producer of dollars. With that thought uppermost, there is no hope of industrial harmony.

Until some fifty years ago, nothing had appeared that could faintly sustain that hope. Then came a discovery from a seeking of facts through the process of engineering. Frederick W. Taylor announced (what in theory might have seemed obvious) that investors, management, and labor were not in fact contenders with each other over the bone of the incoming dollar, but instead all three were engaged together to increase the ratio of incoming dollars to effort. He appealed for a practical adoption of that as the working basis of every enterprise, and further presented what he had developed as the practical means of doing it. Frank to the last, he conscientiously

warned everybody that the change from the traditional to the desired would take a long time, a lot of hard thinking, and a complete mental revolution on the part of the management as to its duties and responsibilities. Less frank, imitators and shysters came to mock him and to offer instead quick-acting, easy-to-take nostrums with promises running into the miraculous. Industry hired the shysters, and vented its disgust on Taylor. That happened on the management side. Many years afterward, the same discovery was made on the side of labor, in a single union, and there is one union leader today who collaborates with the companies in finding practical ways of increasing that same ratio between incoming dollars and effort. In both cases, it was necessary to abandon the idea that the mill runs to make dollars and substitute the idea that production is that which pays all three: investor, management, and labor. If these two cases are considered straws in the wind, the dollar philosophy must blow away.

The Dollar Distraction

In the late twenties, when poverty had at last been driven from the United States and the stock market was constantly climbing, the author went to one of our large cities to negotiate for the purchase of a plant. Although he kept an early appointment and found the men he was to interview at their desks supposedly directing matters concerned with a large manufacturing business, the conference on the deal in question did not take place until the stock market in New York had closed. It came out that these large-scale executives had put up money that day on a quarter-point advance in a certain automobile company stock, and nothing could pass over their desks or telephones until that point had been won or lost and their brokers instructed accordingly.

One other instance: A good business man with a good executive job paying a good executive salary got his eye turned toward Florida while the boom was on. Between Florida and his executive desk he set up channels of inside information. The information brought in by these channels loomed far beyond that which he found in his good executive job. This man leaned toward the occult, and while contemplating a radical move he consulted his astrologist. His horoscope pointed toward a rosy culmination of all moves he anticipated. He resigned his job, entered a partnership, told everybody that the opportunity of a lifetime was at hand—there was no possibility of failure. He threw his life savings and all the money he could borrow from others into his new venture and set off with his partner to clean up in Florida. Eight months later all the money invested had been wiped out.

Instances were common enough then. They do not need multiplying now. The evidence all points to the conclusion that the dollar-minded will take dollars where they find them—speculative dollars are quite as acceptable as earned dollars. Habituated to the dogma that the mill runs to make dollars, they will likewise think they exist in the mill for no better purpose than to make dollars for themselves, which, in the face of rosy chances outside the mill, gives them no hesitancy about neglecting the jobs they are paid for while they cultivate pure chance. If boom times prevail, they are a total loss to their companies because their minds are far away. In tough times, with outside chances gloomy and the inside chance their only dependence, they may temporarily buckle down, but still it runs in the dollar-minded that the mill runs only to make dollars. Where, then, do they look for the mill's main chance? Obviously outward, toward the markets where prices fluctuate, toward the trading centers, toward the sales efforts where the mill's dollar can be a speculative one, too. The dollar-minded feel scarcely any pull of desire toward the problems of sound advance in the arts of manufacture and services to the trade, on which two things the enterprise actually depends.

Dollar Security

If the mill's accounts should show a surplus, whether the dollars were originally speculative or earned, that accumulated reserve would look to the dollar-minded like a bulwark of safety; no matter how much time had elapsed since such reserves had appeared. Standing alone, this reserve would make a nice bulwark—but temptations always haunt the existence of such security. Unwarranted expansion, pushing sales on the sales front to the neglect of process; speculating in the supply market. . . . The list could go on, and there is a factor which would never appear in it, perhaps for the very good reason that it will not class as a temptation. When cash and liquid resources make the future look safest, there is a special opportunity to examine behind the bulwarks for evidence of new ideas. There is nothing in the record to show that dollars are any better protection than the forethought and wisdom with which they are used.

But that does not entirely dispose of this matter of security. If dollars have not bought it, that is one thing. How desirable, then, is security? And how, if not with dollars, has a business ever acquired it? The first question may sound foolish. Offhand, anyone would say that security and safety are his chief aims, his chief duties toward himself and his dependents. But for himself and his own, there is something to be desired even after these simple aims seemingly have been achieved. A little story tells that when ultimate security and peace were dreamed of by all good people, a couple of business men somehow were admitted through the Pearly Gates. Coming from a lively and advancing age in business, it took them some time to accustom themselves to the new and strangely placid environs. There was nothing for them to do but flap their wings and strum their harps. After a bit of that, one said to the other: "Jim, what do you say I race you three times around the Throne for a dollar?"

Strangely new and placid for energetic Americans was the doctrine of "normalcy" into which we settled after the World War (No. 1) to let Europe stew in its own juice while we developed security, and strangely disappointing has that turned out now. Before that, by about a generation was another post-war period. That one was less placid, certainly less secure. No one could even be sure of the value of a dollar. No one had any confidence in the Administration. But out of that period paper and pulp drew enormous benefits in the shape of reform; wood for fiber instead of rag; the groundwood, sulphite, and soda processes of extraction—with the sulphate process soon to follow on the ground they broke—electrolytic manufacture of chlorine, the jordan refining engine, the process of coating paper for better printing and the machines for doing it, electricity to improve on steam. So well did these reforms develop in that perilous time that today we still run with them, substantially as they were handed down, running them faster and wider, but not differently. That was the period above all periods since that advanced the art.

Reforms like these do not just occur. Any one of them costs sweat. The easiest of them all (if you have any idea which one that was) involved risks of money, work, reputation, and inward peace the like of which is known to no man who has never tried such a task. As these great reforms stand today, no one questions their net worth to the industry and to the populace; but never could they have come about except for the willingness to take intelligent clear-headed chances. No such robust infants have ever

been born on a bed of sweet security.

But the institutions which took part became the cornerstone firms of the day, with a degree of soundness and security not equalled since, for their energy and intelligent foresight put them distinctly in the lead and bestowed on them a measure of good will and business confidence that goes with leadership. Without developing important advances in the art, there never has been a way for any one concern to stand apart and ahead of the others. If you summarize the principle, you see that the way to be secure is to live dangerously, but if you dismiss that as a paradox you miss one of the soundest of all working formulas, and the only secure insurance against softness.

The Dollar Future

Implications from this dollar theory might run on—too many to list at one sitting. But ahead lie the most critical years of all history. Price structures, capital structures, social and industrial organization, credit systems, public and private indebtedness, taxation, — all the adjustments and phases of finance and its dollar as we have thus far been given to know them—are getting a shake-up that balks description if not comprehension. When that is over, what is left will face what no one now foresees. But without knowing the pattern of what is now so violently in the making, one thing is certain—there will be thorough-going exhaustion everywhere, leaving the critical necessity of creating anew. If days gone by give any hint, this necessity of creating anew will be on an industrial world beset by the most widespread crime wave of all time. The question is, shall we then soothe ourselves with any such simplification of our job as to say that mills shall run not to make paper and paperboard in the last analysis, but to make dollars? Will policies and procedures built only by that as the working formula be enough? When the need is to recreate wealth and do it fast, will the answer be just to make dollars?

Jogging along comfortably with the dollar philosophy, the habit is now strong to shut off commitments whenever the stock market moves off a point or two. This may be a proper procedure, but it shuts off brains too. When spending seems unwise, thinking takes a holiday. Thinking as a habit of work seems to sit upon us lightly. When dollars are in sight and spending does not hurt the surplus, we see no need of spending either money or brains. When the fever of prosperity dies out, we see no use of straining the brain. According to the dollar theory, there is no time when hard mental labor of the creative kind gets the inescapable call. Through the period of exceptionally smooth business sailing, while the dollar theory was most in the making, nobody added anything to the manufacture of paper and paperboard that compared with the chemical wood processes and the jordan and it has not been done since. Instead, from the dollar theory, everybody is expecting a bright day to come when the needed basic improvements will appear wrapped in Cellophane on a supplier's shelf at a price. As in years gone by, the expectation is that a big lift will come from outside the limits of the going mill rather than from the inside. Everyone assumes when that bright day comes, if the dollars are in hand, he will be "all set." If that statement looks too harsh, there would be a way to soften it, if a spot could be found where fundamental improvement of process or management is the deliberate concern occupying a chief place in the daily internal work of a mill. Up to this point, matters of mechanics and processes have drawn the spotlight, but the word "management" in the preceding sentence crept in for a part of the consideration Because dollar-minded advances seem to appear first in mechanics and process, it seemed better to dispose of these phases of the subject first. As the score stands to date, mechanics and process have received a great deal less —nothing to compare with the chemical wood processes and the jordan— under the dollar philosophy, than they did under the venture philosophy of a harder time.

But mechanics and process do not account for all the opportunities. Others lie in employer-employee relations, which, whether planned or not, exists every minute of every working day no matter the tools and machinery, no matter what the processes. Yet in this human element lies a prime opportunity. With attention and development it can be turned into a vital force enhancing human skill from the bottom up. This builds up more exact specifications in human work equal to the specifications covering raw materials. The opportunity exists within the mill itself. Dollars have not created this opportunity, nor do they stand in its way. What happens in Washington does not affect it. In the distress of the years that lie ahead, whatever happens outside, this one opportunity will forever remain "within the mill itself."

Cultivation of this prime opportunity is an art, as definite and practical as the jobs that have to be done in the mill. Indeed, if it were to be put in a phrase, the art is the art of making an art out of each daily mill job. There are too few qualified in it, but there would be more, and will be, when more executives are half as well trained to be finger-wise to papermaking as they are trained to the books of account. But without undertaking the long detour to consider the art adequately, a note may be made of the fact that human assets are not developed to anything approaching their full without enhancing and stabilizing the grade of service rendered to customers, for genuine skills applied with lively interest cannot fail to lift such prosaic factors as economy, quality, uniformity. Concretely, suppose that we have the tasks defined and measured so they repeat with precision uniformity, we have materials moving through to exact specification, and we do not have to hold down production speed because of variation. With only that comparatively early step in good management, the machines will at once step up to take full advantage of the best prepared stocks, instead of having to play safe against the occasional slump or error. On that basis, without going further, a practical cost saving is conservately estimated at about $60,000,000 per year for the industry, putting it in dollars again. What it would turn besides in terms of price, good will and confidence is beyond easy estimate. What can be made to follow still from that start as the foundation, in terms of advancing process and tooling and method, by reason of having everybody's interest enlisted, is still further beyond the dollar estimate, and has to be tried to be appreciated.

CONVENTIONS AND COMING EVENTS

Dec. 13—Technical Association of the Pulp and Paper Industry, New England Section, Roger Smith Hotel, Holyoke, Mass.

Jan. 7—Technical Association of the Pulp and Paper Industry, Pacific Section, Camas, Washington.

Feb. 17-20—American Paper and Pulp Association, Annual Meeting, Waldorf-Astoria, New York City.

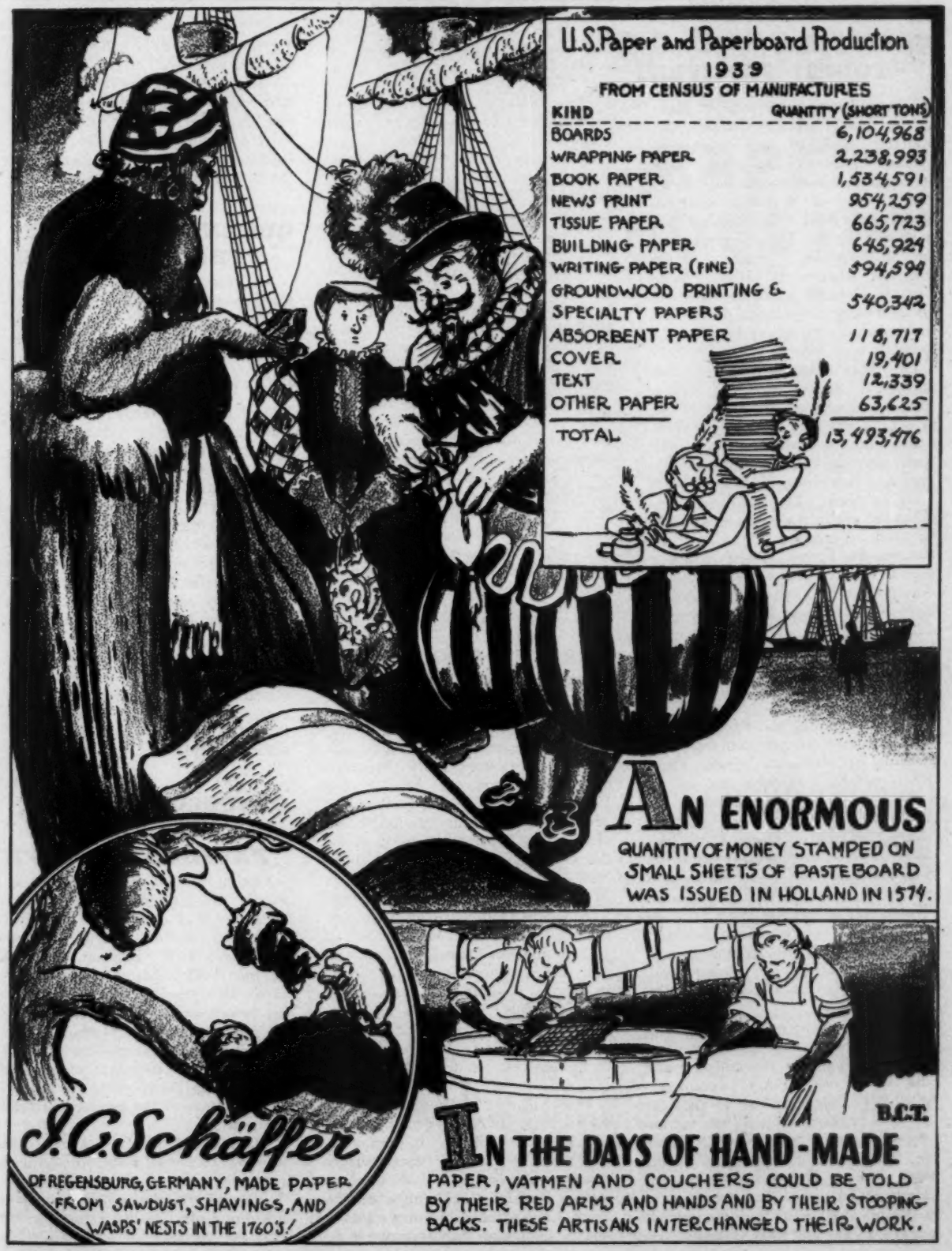
Feb. 17-20—Technical Association of the Pulp and Paper Industry, Annual Meeting, Roosevelt Hotel, New York City.

April 1-4—Eleventh Packaging Exposition and Conference, Stevens Hotel, Chicago.

April 7-11—American Chemical Society, St. Louis, Mo.

May (1941)—National Association of Credit Men, Credit Congress, New Orleans, La.

PAPER SKETCHES


U.S. Paper and Paperboard Production
1939
FROM CENSUS OF MANUFACTURES
KIND | QUANTITY (SHORT TONS)
BOARDS 6,104,968
WRAPPING PAPER 2,238,993
BOOK PAPER 1,534,591
NEWS PRINT 954,259
TISSUE PAPER 665,723
BUILDING PAPER 645,924
WRITING PAPER (FINE) 594,594
GROUNDWOOD PRINTING & SPECIALTY PAPERS 540,342
ABSORBENT PAPER 118,717
COVER 19,401
TEXT 12,339
OTHER PAPER 63,625
TOTAL 13,493,476
AN ENORMOUS QUANTITY OF MONEY STAMPED ON SMALL SHEETS OF PASTEBOARD WAS ISSUED IN HOLLAND IN 1574.
J.C. Schäffer OF REGENSBURG, GERMANY, MADE PAPER FROM SAWDUST, SHAVINGS, AND WASPS' NESTS IN THE 1760'S!
B.C.T.
IN THE DAYS OF HAND-MADE PAPER, VATMEN AND COUCHERS COULD BE TOLD BY THEIR RED ARMS AND HANDS AND BY THEIR STOOPING BACKS. THESE ARTISANS INTERCHANGED THEIR WORK.

ASSOCIATIONS

SLASH PINE FOREST FESTIVAL

Two addresses by Dr. W. J. Hale, of the Dow Chemical Company, of Midland, Michigan, and a gorgeous pageant, "Dream of the Pines," were the highlights of the Slash Pine Forest Festival held at Waycross, Georgia, November 11-16. The festival was sponsored by the Herty Forest Institute of Waycross, a memorial to the late Dr. Charles H. Herty, noted Georgia chemist who developed in his laborotary at Savannah the process for manufacturing newsprint from the southern pine trees.

Dr. Hale in his address on "Chemurgy is Self-Sufficiency," emphasized the fact that the time is approaching when in order to survive a nation must be self-sufficient within itself, owning the land on which is produced everything it uses.

"This means," Dr. Hale said, "that all of the products of agriculture must be used by industry, with food and clothing the by-products of industrial use; in turn all of the products of industry must be consumed by agriculture. Thus we have full employment, full utilization of resources, with everyone a paying customer. . . . There will be no exports and imports. Each country owns and produces all of its needs."

The first day of the Festival being Armistice Day, the program was sponsored by the American Legion. There were patriotic addresses and an air carnival of thrilling air stunts at the Waycross airport.

On Tuesday the "Queen of the Forests" was chosen from many princesses who had gathered from all sections of South Georgia for the festival. Wednesday was devoted to a program on forest fire control, under the direction of A. G. T. Moore, manager of the department of conservation, Southern Pine Association, New Orleans, Louisiana.

The high point in the week's program was reached on Thursday when Dr. Hale spoke in the morning and the "Dream of the Pines" pageant presented that evening. The closing scene of the pageant showed the unveiling of a life-size painting of Dr. Herty by the famous Dutch artist George Van Saake. The dedication of the Herty Forest and the ceremony of breaking ground for the new institute and museum building scheduled for that day were postponed due to weather conditions.

Dr. Hale spoke again on Friday, this time to the young people, and the festival came to a close Saturday with a field meet and football game.

The Herty Forest Institute is the southern pine territory's memorial to the late Dr. Herty. Various buildings are to be constructed on a tract of 800 acres, which are a part of 40,000 acres owned by the United States government and known as Herty Forest. On the 800 acres, which have been leased to the institute, will be erected the group of buildings which will house a forestry museum, forestry library and it will be the home of the forest festival organization.

The institute will serve the 4-H clubs, and will teach visual education, including junior forest rangers. It will sponsor a demonstration pine forest in every county in Georgia, wild life development in the state, and forest farmer clubs. It will co-operate with the various counties in their fire control campaigns, foster the teaching of forestry in the schools, and work with state and county authorities in soil conservation.

◆

HEATING ENGINEERS HEAR DR. CARRIER

The Connecticut Chapter of the American Society of Heating and Ventilating Engineers held its inaugural banquet on November 10. Scene of the banquet was the New Haven Lawn Club, New Haven, Connecticut, and the main speaker was Dr. Willis H. Carrier, chairman of the board of the Carrier Corporation, Syracuse, New York.

Citing achievements of the American Society in the field of air conditioning particularly, Dr. Carrier, a past president of the national organization, said that scientific and engineering societies as a whole have been responsible for the "stimulation and conservation" of much of the progress achieved in new fields of engineering in the last few decades.

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▶▶▶ THE FOURTH ALABAMA WATER CONFERENCE, held at the University of Alabama, November 8-9, featured a talk by D. W. Haering, president of D. W. Haering and Company, Chicago. Mr. Haering spoke on the "Study and Solution of Water Treatment Problems in Atmospheric Cooling Systems," describing an entirely new method for the attack of these problems and discussing for the first time, the operation and preliminary data obtained with the six new laboratory model cooling systems at the Haering Research Laboratory.

◆

ORGANIZE TO STUDY FREE ENTERPRISE

The formation of a "Community Co-ordinating Committee" to further the campaign of the National Association of Manufacturers to "mobilize for the understanding of free enterprise," was announced recently by H. W. von Morpugo, director of public and industrial relations at the Paraffine Companies, Inc., San Francisco. The San Francisco committee is one of many being formed in the key cities of the United States.

Personal participation of businessmen in eighteen projects outlined by the NAM will be the goal of the committees which will seek to inform every segment of American life of the benefits which the free enterprise system have brought to the American people.

Included among those on the San Francisco committee are Alexander Heron, industrial relations director of the Crown Zellerbach Corporation and Peter Duignam, assistant industrial relations director of C-Z.

◆

OPTIMISM RULED KEYNOTE OF NAT. PAPERBOARD ASS'N

Optimism ruled at the annual meeting of the National Paperboard Association held at New York City, November 13-14. In the absence of Colonel E. W. Ellerson, president of the Association, Alan G. Goldsmith, vice president, presided and in his report spoke of the many phases of paperboard industry affairs. Particular attention was paid to the work in progress on national defense and sanitation in board mills, to guarantee the purity of the product for food containers.

Held at the Waldorf Astoria, the meeting provided ample opportunity for a discussion of industry problems. The general view was that the paperboard industry has been fortunate in that the demand for its product has

continued on a reasonably level keel. Demand throughout the year has been well sustained and has permitted a fair rate of operations.

Officers elected to serve for the ensuing year were: Charles E. Nelson, Mac Sim Bar Paper Company, president; George E. Dyke, Robert Gair Company, vice president; Frederick G. Becker, of New York City, executive manager, and H. S. Adler, Chicago, secretary and treasurer.

Directors elected and the sections they represent include the following:

Eastern Container Board—George E. Dyke, Robert Gair Company; Alan G. Goldsmith, Mead Corporation, and D. F. Lawless, Lawless Brothers Paper Mills.

Western Container Board—Marcus B. Hall, American Boxboard Company; Walter P. Paepcke, Container Corporation of America, and P. A. Schilling, Waldorf Paper Products Company.

Southern Container Board—Alexander Calder, Union Bag and Paper Corporation, R. J. Cullen, Southern Kraft Corporation; H. W. Ellerson, The Chesapeake Corporation; C. W. Gaylord, Gaylord Container Corporation; Fred E. Hummel, Hummel-Ross Fibre Corporation, and S. M. Phelan, Jr., West Virginia Pulp and Paper Company.

Eastern Boxboard—W. G. Latham, Fort Orange Paper Company; George W. Mabee, National Folding Box Company, and W. G. Shortess, Federal Paper Board Company.

Western Boxboard—E. T. Gardner, Gardner-Richardson Company; F. M. Lebold, Morris Paper Mills, and W. I. Osborne, Jr., Cornell Wood Products Company.

Corrugating Materials—C. D. Altick, Terre Haute Paper Company; H. T. Cherry, Central Fibre Products Company, and Sidney Frohman, Hinde and Dauch Paper Company.

Pacific Coast—John W. Kieckhefer, Kieckhefer Container Company; D. H. Patterson, Jr., Fibreboard Products, Inc., and C. J. Schoo, Longview Fibre Company.

Lightweight Chipboard & Bogus—H. J. Finder, Prairie State Paper Mills; J. E. Kieffer, Kieffer Paper Mills, and H. D. Schmidt, Schmidt & Ault Paper Company.

Directors at Large—W. J. Alford, Jr., Continental Paper Company; Roger L. Main, St. Joe Paper Company; G. E. Nelson, Mac Sim Bar Paper Company, and G. G. Otto, Alton Box Board Company.

Modern ELEVATED STORAGE *provides* FIRE PROTECTION *for the* PAPER INDUSTRY

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CHESAPEAKE-CAMP CORP.

Illustrated above is the 100,000-gal. Horton ellipsoidal-bottom elevated tank used for a sprinkler service at the Franklin, Va. mill of the Chesapeake-Camp Corporation.

SCOTT PAPER CO.

The 100,000-gal. tank at the left supplies water for hose and hydrant outlets and for sprinkler service. It is a standard structure enclosed in steel sheeting to resemble a roll of ScotTissue.

BRUNSWICK PULP & PAPER CO.

At the left is a view of the 150,000-gal. elevated tank used for general water supply and sprinkler service at Brunswick, Georgia.

CONTAINER CORP.

Shown at the right is the 100,000-gal. elevated water tank installed for sprinkler service at the Container Corporation of America mill, Fernandina, Florida.

ILLUSTRATED above are four typical examples of the way in which elevated water tanks are employed to provide gravity water pressure for automatic sprinkler systems used to protect paper mills from the danger of destruction by fire. With a gravity supply in an elevated tank, an adequate water reserve is held above the property, ready to flow the instant any blaze opens a sprinkler head. A few gallons of water sprinkled directly on the flames will quench the fire before it has a chance to spread and cause extensive damage. Write for information.

CHICAGO BRIDGE & IRON COMPANY

Cleveland.....2267 Builders Exchange Bldg.
Birmingham.....1511 North Fiftieth Street
Tulsa.....1651 Hunt Bldg.
Houston.....918 Richmond Avenue
Detroit.....1566 Lafayette Bldg.
Philadelphia.....1653-1700 Walnut Street Bldg.
Boston.....1562 Consolidated Gas Bldg.
Los Angeles.....1459 Wm. Fox Bldg.
Chicago.....2445 McCormick Bldg.
New York.....3350-165 Broadway Bldg.
Dallas.....1446 Praetorian Bldg.
San Francisco.....1017 Rialto Bldg.

Plants at Birmingham, Chicago and Greenville, Pa.

ALLIED

CALCO CHEMICAL OPENS NEW WATER TREATMENT PLANT

A new half-million dollar effluent treatment plant was officially placed in operation at the Bound Brook (New Jersey) unit by the Calco Chemical Division, American Cyanamid Company, on November 7 in the presence of Governor A. Harry Moore, members of the State Department of Health and Sanitation, as well as various local and company officials.

The new plant is located nearly a mile westward from the main Calco plant. It is made up first of a compositing basin having a 5½-acre surface. The bulk of the decolorizing takes place here. Adjacent to this first basin is another where ten million gallons of alkaline carbonate obtained from the nearby Johns-Manville Company have been collected. Thirdly, there is mixing and controlling equipment which automatically regulates the addition of the carbonate slurry to the treated effluent to maintain a constant *p*H. The next unit in the process is a 60-million gallon capacity settling lagoon having a 23-acre surface which gives a 5 to 6-day detention period. Lastly, is a diffusion, aeration and dilution dam stretching across the Raritan River. This accomplishes rapid and full dilution of the treated effluent with the river water as it comes over the dam.

The development of the new treatment methods used in this plant was outlined by Dr. V. L. King, technical director of Calco, at a luncheon attended by the Governor and other guests. After the luncheon, a convincing demonstration was made of the effectiveness of the new plant in prevention of pollution of the Raritan River.

◆

EXPANSION TAKING PLACE AT MAGNUS

An increase in the manufacturing space at the Magnus Chemical Company, Inc., Garwood, New Jersey, was announced recently. On August 1 four additional buildings were taken over, representing an increase of manufacturing space of over 120 per cent. These buildings have been completely renovated and the installation of new equipment is now under way.

One building of brick and steel construction will house the new grinding and milling department, where many of the new developments and products being manufactured by Magnus will be made. Another building, made of steel and concrete, will be used for special chemical processing in connection with the manufacture of a number of special products which have been well received in the industrial field.

◆

DOWNINGTOWN BUYS WIENER

The Downingtown Manufacturing Company, Downingtown, Pennsylvania, has purchased the business, patents, patterns and designs of the Wiener refiner and the Wiener stock regulating valve, it was announced recently. These products were formerly manufactured by the Wiener Refiner Engineering Company, Oswego, New York.

◆

▶▶▶ SALE AND DISTRIBUTION of the Babcock & Wilcox Tube Company's seamless tubular products in Argentina, Brazil, Paraguay and Uruguay are handled by Babcock & Wilcox, Ltd., of London, England, through their offices in the foregoing countries, it is announced.

◆

NEW PROCESS TO MAKE FILLER FROM MARBLE

A filler manufactured from marble and which is to be used in the paper, paint, rubber and linoleum industries, was announced recently in Proctor, Vermont, where a new organization, the White Pigment Corporation, has been formed. The filler will be produced through a new process, it was reported.

Interests of the Vermont Marble Company of Proctor, and the Thompson-Weinman Company, Waltham, Massachusetts, have been combined in the new organization. The former company has been supplying marble for some time to the Massachusetts firm, and it is announced that eventually the entire machinery of the Thompson-Weinman plant will be moved to Florence, Vermont, where the marble grinding plant is being enlarged to double its present capacity to accommodate the new business. The company claims that while marble filler has been found an able substitute for filler types previously used, the new process permits production of a higher quality than has been heretofore developed.

C. L. Montgomery of West Rutland, Vermont, was elected president of the new company and Holland W. Smith was named vice president. Benjamin Williams is secretary and Howard Smith is treasurer.

◆

▶▶▶ A NEW CHIPPING MACHINE has been installed in the Menominee Indian Mills, Keshena, Wisconsin. The machine has a capacity of sixty tons of hardwood chips daily which will be used for the manufacture of plastics. A new railroad spur enables the chips to be blown directly from the chipper into railroad cars. The Menominee Indian Mills company recently increased the size of its lumber yard at the Neopit (Wisconsin) plant by filling in part of the bay adjoining the company's property.

◆

WORTHINGTON TO BUILD NEW UNITS

Plans are now being rushed for the construction of a new and modern mill building for the Holyoke (Massachusetts) works of the Worthington Pump and Machinery Corporation—the result of negotiations recently completed with the War Department. The Holyoke plant is to manufacture anti-aircraft gun mountings and parts of propeller mechanism, according to Harry A. Feldbush, vice president of the Worthington organization.

The new building will be one story high, of steel construction, and with modern lighting facilities. The old foundry, idle since 1932, will be remodeled to house the machine tool work in connection with the national defense program and the first two floors of the pattern storage building will be used for the manufacture of airplane propeller parts.

Addison C. Armstrong, formerly department manager of the Truscon Steel Company at Youngstown, Ohio, will supervise the building of the anti-aircraft gun mountings. He will act as general manager.

◆

RICE, BARTON & FALES NOW HAS NEW NAME

Rice, Barton & Fales, Inc., paper and pulp machinery manufacturers of Worcester, Massachusetts, has changed its name. The company, known in American industry since 1837, is now called the Rice Barton Corporation according to a recent announcement by George S. Barton, president, who explained that the change was made

EQUIPMENT LARGE AND SMALL SERVES BETTER, LONGER

◆ CRODON-Plating Increases Net Profits ◆

Let CRODON-plating do for you what it is doing for thousands of others...

Improving finish. Because of its permanently hard, smooth surface, CRODON-plated equipment can turn out a product to far more accurate specifications and with a more perfect finish. If the finish of your product is vital to its success CRODON-plating your equipment will help you achieve a more perfect finish — quicker—and at a lower cost of production. Chromium is the **hardest** commercial metal and because of this will give your equipment an extremely hard, **smooth** corrosion-resisting surface.

Cutting maintenance costs. CRODON-plating reduces the frequency of repairs and replacements and expensive delays incident thereto. Its hard, easily cleanable surface insures economical, long-lived service — keeps your equipment running longer, more efficiently—by drastically reducing the amount of valuable production time necessary for overhaul and repairs.

6 ton welded steel drum; diameter 6 feet; face 5 feet — face area, 13,570 square inches. CRODON-plated and polished to a high lustre finish to insure a better product.

The CRODON trade-mark is your assurance of the best chromium plating and thoroughly expert application — practical, economical, completely serviceable. The CRODON name assures you of service backed by the experience and reputation of the oldest, largest industrial chromium plating organization in America.

Write today for full information.

CRODON PLATING pays

CHROMIUM PLATING

CHROMIUM CORPORATION OF AMERICA

Executive Offices . . . 120 Broadway, New York

346 Huntingdon Avenue, Waterbury, Conn. — 1760 Lakeview Road, Cleveland, Ohio — 4648 West Chicago Avenue, Chicago, Ill.

to conform to the accepted identification of the concern's products.

With the passing of the name "Rice, Barton & Fales" there is brought to mind much of the history of this organization which began operations over a century ago in a small New England village. The company was formed by Henry P. Howe and Isaac Goddard to manufacture paper-making machinery. Howe originated the system of fire drying in paper-making and his partner had learned the paper-making trade under Isaiah Thomas, foremost American printer, publisher and papermaker of that era. The two began business in the old "Red Mills" section on Green Street in Worcester, moving in 1843 to Union Street and adding the manufacture of textile machinery.

In 1846, George M. Rice was admitted to the firm and the name was changed to Howe, Goddard and Company. On Howe's death the name was again changed to Goddard and Rice.

George Sumner Barton, grandfather of the present president, joined the company in 1845 and four years later became a member of the firm, with the name again changed, this time to Goddard, Rice and Company. The firm was among the first to install steam engines for power and was an industrial pioneer in several other respects.

The perfection of an envelope-making machine at the shop of Goddard, Rice and Company, is credited with giving the envelope industry in Worcester its start. This machine was invented by Dr. Russell L. Hawes, who also invented a printing press, paper bag machine and a wall paper printing machine.

Rice, Barton & Company, came into existence in 1862 with the former superintendent, Joseph E. Fales, as a partner with Rice and Barton. Its certificate of incorporation, one of the first issued in Massachusetts, was granted in 1867 at which time the name was Rice, Barton & Fales Machines & Iron Company.

Charles Sumner Barton, father of the present president, started in the business in 1879. His son, George S. Barton, came into the industry in 1903 and was elected president in 1914. Charles S. Barton is the present secretary of the firm and J. Warren Vedder is vice president and general manager with Lester M. Stuart as vice president and sales manager. Stuart B. Dickerman is assistant treasurer. The company's plant in Worcester has been occupied since 1893 with paper and pulp machinery now its chief product. The name was changed in 1922 to Rice, Barton & Fales, Inc.

International Wire Works offers

SAFE ECONOMICAL SOLUTIONS

to all pulp and paper mill drainage problems

√TWILL WEAVE
√PLAIN WEAVE
√SEWED SEAM
√SOLDERED SEAM

INTERNATIONAL WIRE WORKS

MENASHA, WISCONSIN

BIRD MACHINE GETS PATENT RIGHTS ON SALL

Exclusive rights for the manufacture and sale of the Sall regulator have been acquired by the Bird Machine Company, South Walpole, Massachusetts, from the A. K. Ekstroms Machine Company of Stockholm.

The Sall regulator will hold consistency to within plus or minus 0.1 per cent and handles a range of consistencies from less than 1 per cent to 12 per cent, it is claimed. It is reputedly fool proof and trouble proof and, say its manufacturers, it is simple to operate.

◆

PITTS. P. GLASS ANNOUNCES NEW CHEMICAL DIV.

Sale of chemical products manufactured by the Pittsburgh Plate Glass Company are now handled by the company's Columbia Chemical Division. Previously, sale of such chemicals as soda ash, caustic soda and chlorine, was handled through the Columbia Alkali Corporation, a wholly-owned sales division.

This action, it was announced, does not affect the personnel or sales organization. Customers will merely purchase direct from the Columbia Chemical Division of the company rather than through a wholly owned sales corporation as they have in the past. Eli Winkler, executive sales manager and W. I. Galliher, director of sales, retain their respective positions. It is also announced that the status of existing contracts of the Columbia Alkali Corporation and existing distributor relationships will not be affected by the change.

◆

▶▶▶ THE OCTOBER ISSUE of *The Dominion Engineer*, published monthly by the Dominion Engineering Company, Montreal, contains several illustrations of paper-making machinery manufactured by the Canadian firm. Included in this release are four photos showing pieces of equipment designed for Interlake Tissue Mills, Quebec North Shore Paper Company, and the Powell River Company.

◆

▶▶▶ THE CEMENT SALES OFFICE of the Pittsburgh Plate Glass Company will be moved from Pittsburgh to Zanesville, Ohio, it was announced recently. Zanesville is the location of the company's cement plant. Coincidental with this announcement was news that A. R. Haley, formerly president of the J. P. Loomis Coal and Supply Company, Akron, Ohio, had been named sales manager of the cement division succeeding the late L. C. Letzkus.

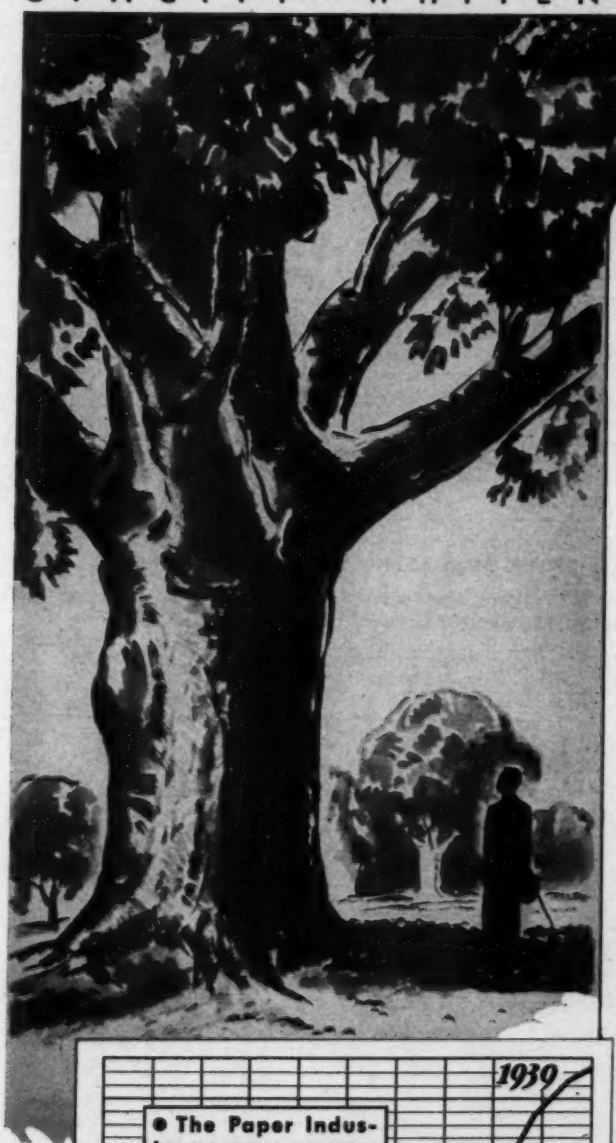
◆

"NETWORK CALCULATOR"

As an aid to engineering problems and in order to avoid laborious calculations in connection with proposed or existing power systems, the Westinghouse Electric and Manufacturing Company has developed a unique device known as a "Network Calculator."

An exact small-scale replica of any proposed or existing power system can be produced at the East Pittsburgh works of the company by use of this calculator. The device resembles a telephone switchboard and has some 300 wire circuits which can be varied, adjusted and interconnected to simulate an actual electrical system. The machine has its own sources of power that can be arranged to correspond to power sources on any system. According to reports, many companies have used this calculator in circuit analyses, while some have obtained similar equipment for their own use.

OPACITY • WHITENESS • BRIGHTNESS



The ACORN is now a MIGHTY OAK

What better measure could there be of the value of TITANOX in the pigmenting of paper than the enormous volume of it consumed annually in the paper industry and the great number of consumers?

And all this has resulted in a short decade. Ten years ago paper manufacturers were experimenting with TITANOX pigments. Today, excepting for the paint industry, they are the largest users.

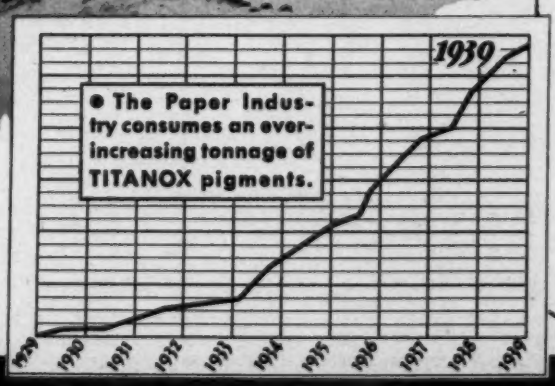
The reason for this success is apparent. TITANOX pigments have justified every claim made for them. They have established leadership in quality and service. They have aided the paper industry efficiently in its efforts to improve its various products through opacity, whiteness and brightness.

Technical paper problems are welcomed by our Service Department whose cooperation is based on wide experience.

TITANIUM PIGMENT CORPORATION

SOLE SALES AGENT

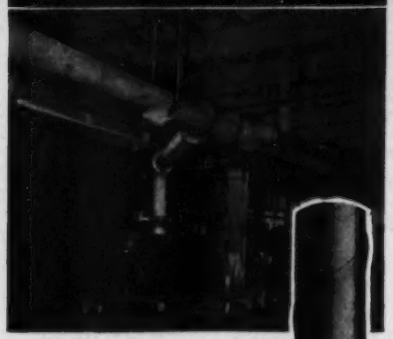
111 Broadway, New York, N. Y.; 104 South Michigan Ave., Chicago, Illinois; National Lead Co. (Pacific Coast Branch), 2240 24th Street, San Francisco, California.



TITANOX

TRADE-MARK

Not how HEAVY
..but how STRONG



— that's the real "measure" of pipe

THE spiral reinforcing seam of Taylor Forge light wall pipe has given it resistance to bursting, collapsing and other stresses equal to that of wrought pipe of twice its weight.

Cutting weight in half saves on handling and shipping charges—cuts installed cost in half. This means that the more jobs you find for this modern, efficient pipe in your plant, the more you can save. A complete line of lightweight, streamlined fittings, plus the Taylor Forge Special Fabricating Service, adapts Taylor Spiral Pipe into the most intricate layout.

Write for Catalog 404

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New York Office: 50 Church St.
Philadelphia Office:
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TAYLOR Spiral PIPE

SAFETY

SAFETY WARNING TO PAPER MILLS

An accident which occurred recently in one of the larger Wisconsin paper mills has prompted a special warning being sent out at present by safety engineers of the Employers Mutual Liability Company, Wausau, Wisconsin.

A common practice in paper mills is the cleaning of paper machine screens with gasoline. A not unusual practice in a paper mill is the use of welding for the repair of machine or parts. When these two operations occur at the same time, trouble is likely to happen.

Recently a crew was cleaning a screen with gasoline. Shortly after they began work, another crew wheeled in a welding outfit, set up an eye protecting curtain and proceeded to go about repairing a part of a machine.

Fumes from the gasoline cleaning operation were drifting over to the welding operation, right over the curtain. There was a flash explosion which burned three, injured two others, and broke a dozen windows.

It is pointed out that gasoline should not be used for cleaning purposes. in the last few years, it is stated, many cleaning agents have been developed which do the same job as gasoline yet are much safer to use. Paper mill operators are urged to avoid the use of gasoline in cleaning so that accidents such as these do not occur.

The Paper Industry Safety Contest

July 1, 1940 to June 30, 1941

Out of 191 mills reporting for October, 30 have perfect record

PERFECT SCORES
Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
Anglo-Canadian Pulp & Paper Mills, Ltd.	Limoilou, P. Q.	Canada
Consolidated Paper Corp., Ltd.	Port Alfred, P. Q.	Canada
The Flintkote Company	Pioneer Division	Los Angeles, Calif.
GROUP B		
P. H. Glatfelter Company	Spring Grove	Pennsylvania
GROUP C		
Escanaba Paper Company	Escanaba	Michigan
Donohue Brothers, Ltd.	La Malbaie, P. Q.	Canada
Strathmore Paper Co.	West Springfield	Massachusetts
The Eddy Paper Corp.	White Pigeon	Michigan
Price Brothers & Co., Ltd.	Jonquiere, P. Q.	Canada
Strathmore Paper Co.	Woronoco	Massachusetts
Rising Paper Company	Housatonic	Massachusetts
The Mead Corp.	The Harriman Co.	Harriman, Tenn.
GROUP D		
American Writing Paper Corp.	Parsons Div.	Holyoke, Mass.
Bird and Son, Inc.	Phillipsdale	Rhode Island
Eclecek Mfg. Company	Turners Falls	Massachusetts
American Asphalt Roof Corp.	East St. Louis	Illinois
U. S. Gypsum Company	N. Kansas City	Missouri
Spaulding Fibre Co., Inc.	Milton	New Hampshire
Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Me.
Rogers Fibre Co., Inc.	Fibreboard Mill-Div. I	Bar Mills, Me.
The Mead Corporation	Nashville	Tennessee
*International Paper Co.	Livermore No. 11	Livermore Falls, Me.
Central Fibre Products Co.	Vincennes	Indiana
Spaulding Fibre Co., Inc.	Hayes	New Hampshire
Division II—Paper and Board Re-Manufacturing		
Gaylord Container Corp.	St. Louis Container Plant	St. Louis, Mo.
Bird and Son, Inc.	Chicago	Illinois
Gaylord Container Corp.	Dallas	Texas
Bird and Son, Inc.	Shreveport	Louisiana
Gaylord Container Corp.	Houston	Texas
*Bay West Paper Company	Green Bay	Wisconsin

*October report missing—covers three months only.

SUMMARY OF CONTEST EXPERIENCE

Division	Man-Hours Worked	Reportable Injuries	Frequency Rate 1940-41 (4 mos.)	Change from July-Oct., 1939
All Divisions	60,814,909	876	14.40	−2 per cent
Paper & Pulp	54,968,038	795	14.46	−2 per cent
Group A	35,907,418	437	12.17	+ 5 per cent
Group B	10,745,276	173	16.10	−12 per cent
Group C	5,426,012	119	21.93	+ 3 per cent
Group D	2,889,332	66	22.84	−11 per cent
Paper & Board Re-Manufacturing	5,846,931	81	13.85	+ 4 per cent

★ STANLEY STRAPPING SYSTEM ★

A TOOL FOR EVERY JOB
...from sealing the smallest package to bracing a carload. Full information on request. THE STANLEY WORKS, Steel Strapping Division, 142 Lake Street, New Britain, Conn.

NAMES *in the* NEWS

Personals

GLATFELTER 50-YEAR CLUB HAS NEW MEMBER

A banquet in honor of Daniel S. Baker's fiftieth anniversary with the P. H. Glatfelter Company, Spring Grove, Pennsylvania, was tendered him on November 20 when he became a member of the paper company's exclusive 50-Year Club.

Mr. Baker began his employment on November 20, 1890, at the age of 15 and has had a remarkable record. Seldom was he prevented from performing his duties by sickness or other causes. Day or night, whether during or after regular hours, he was always ready to help.

At the banquet P. H. Glatfelter, president of the company, reviewed many of the important events that have occurred in the past fifty years and spoke proudly of Mr. Baker's knowledge and experience in the progress of the Glatfelter company and the development of its papers. At the conclusion of the address Mr. Glatfelter presented Mr. Baker with a beautiful gold watch, a gift from the company. Another surprise of the banquet came when S. Carroll Wentz, superintendent of the machines, presented the honor guest with a handsome clock, a gift from the Old Timers of the company.

There are now seven members in Glatfelter's 50-Year Club. In addition to Mr. Baker the club includes, George F. Hawkins (57 years), Adam Stambaugh (57 years), Phares E. Jamison (57 years), Daniel Jamison (51 years), Virginia Ruth (51 years), and William L. Stambaugh (51 years).

◆

WOMAN ENGINEER HONORED AMONG 100

Margaret Ingels, M.E., the first woman air conditioning engineer in America, was honored as one of the 100 career women at the Women's Centennial Congress recently held in New York City.

Since 1929, Miss Ingels has been employed by the Carrier Corporation, Syracuse, New York. She is at present engineering editor and has written articles for publication in many magazines and technical publications. She is said to be the first woman in the world to receive the degree of mechanical engineer.

◆

▶▶▶ Now superintendent of the Port Edwards (Wisconsin) mill of the Nekoosa-Edwards Paper Company, is *William J. Lamory,* formerly general superintendent of the Crocker, Nonotuck and Riverside divisions of the American Writing Paper Corporation, Holyoke, Massachusetts. Mr. Lamory officially begins his duties on January 1. Mr. Lamory has been connected with the AWP for thirty years. He was superintendent of the Wauregan division and later was promoted to superintendent of the three divisions.

◆

▶▶▶ *Frank L. Broeren,* formerly manager of the Menasha Products Company's sales to paper jobbers, is now director of sales of the company, it was announced recently. *A. W. Stompe* succeeds Mr. Broeren. Both men are well known to paper merchants and to the paper industry. Mr. Broeren has been identified with Menasha's sales department for more than twenty years and Mr. Stompe has been associated with the company, in a sales capacity, since 1937.

◆

BLACKMER PUMP REORGANIZES SALES DIVISION

A reorganization of the sales division of the Blackmer Pump Company, Grand Rapids, Michigan, was effected recently.

In this expansion set-up, Bruce P. Hetler, who has held the title of general sales manager, becomes manager in charge of engineering sales and J. B. Trotman now becomes general sales manager in charge of sales distribution and advertising.

Mr. Trotman is a newcomer to the Blackmer organization but has had years of pump sales experience with Goulds Pumps, Inc., and lately as manager for the Roots-Connersville Blower Corporation's turbine pump division. When this latter company decided to sell their small pump business and confine their efforts to older lines, Mr. Trotman transferred to the Blackmer company.

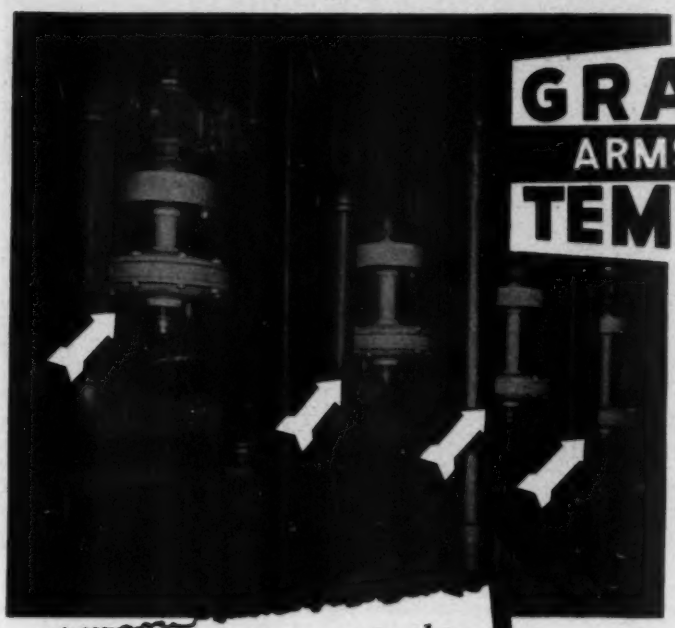
The increased demand for specialized engineering services on pump applications now makes it necessary for Mr. Hetler, who has been with the Blackmer organization for years, to devote his entire time to this work.

◆

▶▶▶ Now sales manager of the American Pad and Paper Company, Holyoke, Massachusetts, is *John T. Whalen,* a member of the company for 25 years. Mr. Whalen has served as representative in the company's New York office. His appointment was announced by Donald T. Taber, general manager of the company.

Daniel S. Baker (left) receives gold watch from P. H. Glatfelter at banquet given in his honor to mark his fiftieth anniversary with the P. H. Glatfelter Company.

USER REPORTS...



GRADUATED TEMPERATURE CONTROL

ARMSTRONG - STAMM

THE picture at the left shows four special mercury loaded valves that are a part of one of the Armstrong-Stamm Graduated Temperature Control Systems used on two paper machines in a prominent Michigan mill that produces book papers and bleached sulphite specialties in weights ranging from 25 lbs. to 150 lbs.

The superintendent of the mill reports use of 12 lb. steam pressure for all sections of each machine. The Armstrong-Stamm equipment is installed on the wet end and is adjustable for a surface temperature of 140° to 180°F. on the first dryer with the next three dryers graduated slightly warmer.

(Extracts from a report by the user of the above installation)

9. Any increase in machine speed with ARMSTRONG-STAMM units? *Yes*

10. Any reduction in spoilage? *Approx. 10%*

11. Any time saving through reduction of breakage on machines? *Yes*

12. Most noticeable improvements in quality of sheet produced? *More uniform drying and ability to carry more moisture in sheet*

13. Any other benefits to report? *System helps all conditions in general*

14. Any objectionable features noted? *No*

...NUMEROUS BENEFITS!

PAPER MILL MEN throughout the country have been quick to perceive that the Armstrong-Stamm Graduated Temperature Control System offers exactly what many of them have been wanting for years: highly flexible control . . . rugged, dependable mechanical parts . . . easy adaptability to any machine . . . wide latitude in cost to fit any budget.

Specific benefits that are attributed to use of graduated temperatures for dryers include improvement in finish and lay, reduction of cockle difficulties, and elimination of picking and sticking on wet end dryers. We will be glad to supply detailed information about the Armstrong-Stamm system. Write today.

ARMSTRONG MACHINE WORKS

GRADUATED TEMPERATURE CONTROL SYSTEMS
•
MOISTURE CONTROL SYSTEMS
•
DRAINAGE SYSTEMS

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THREE RIVERS, MICH.

RECORDING AIR RELIEF CONTROLLERS • AIR RELIEF VALVES • MOISTURE CONTROL DETECTORS • DRYER DRAINAGE RESTRICTORS • DRYER AIR EJECTORS • GRADUATED TEMPERATURE CONTROL VALVES • DRYER DRAINAGE UNITS • STEAM TRAPS • HUMIDIFIERS

MISS KIELY HONORED AS CAREER WOMAN

Miss Helen U. Kiely, head of the laboratory of the American Writing Paper Corporation of Holyoke, Mass. and pioneer in the technical control of papermaking materials, processes and products, was honored by inclusion in a list of 100 outstanding career women of the country. The list was made up by Mrs. Carrie Chapman Catt and read before a meeting at the Woman's Centennial Congress in New York on Nov. 26. The meeting was called to review the last hundred years of the struggle for women's rights and to map a plan for future action in that direction, Mrs. Franklin D. Roosevelt who heads Mrs. Catt's list, acted as chairman and summarizer of the initial discussion.

Although invited to the meeting, Miss Kiely was unable to attend because of conferences involving technical papermaking matters. She is working on the development in conductive paper for the production of facsimilies without the use of carbon sheets. Miss Kiely has been with the AWP since 1918. When she started the company had 259 grades of bond papers; it now has nine, so that much of her work has been standardization of grades for economy. Another important phase of her work has been the development of new uses of paper, such as paper in matches, new types of blueprint paper and tracing paper. Miss Kiely was the first woman to be admitted to TAPPI and is now New England secretary of that group.

◆

COLUMBIA ALKALI ANNOUNCES TWO NEW APPOINTMENTS

Now a member of the Technical Service Department of the Columbia Alkali Corporation Division of the Pittsburgh Plate Glass Company, is Frank Waldo, formerly a member of the firm of E. M. & F. Waldo, importers and dealers in colors and pigments. Mr. Waldo has become associated with Columbia in the capacity of market research specialist. Also recently made a member of the Technical Service Department of Columbia Alkali is James B. Gaskins, a graduate of the William and Mary College. Mr. Gaskins was formerly associated with the Central Scientific Company, Meigs, Basset and Slaughter (consulting chemists), J. T. Baker Chemical Company, Commercial Solvents Corporation and the Will Corporation.

Miss Kiely at work in her laboratory.

G-E APPOINTS TWO VICE PRESIDENTS

The appointment of Dr. W. D. Coolidge and Stuart M. Crocker as new General Electric vice presidents has been announced by Charles E. Wilson, president of the company. Dr. Coolidge is to continue as director of the General Electric research laboratory in Schenectady while Mr. Crocker will relinquish his duties as manager of the company's air conditioning and commercial refrigeration department at Bloomfield, New Jersey, to make his headquarters in New York City where he will take over general duties.

Dr. Coolidge is noted for his own achievements with X-ray tubes, ductile tungsten and submarine detectors and has been a member of the research laboratory staff since 1905. Mr. Crocker, associated with G-E since 1921, has been manager of the air conditioning and commercial refrigerating department since May, 1939.

◆

▸▸▸ *E. D. Small,* for twenty years chief engineer for the Fox River Paper Corporation, has retired. The 70-year-old engineer, who moved to Appleton, Wisconsin, from Holyoke, Massachusetts, where he was connected with AWP, was presented with a plaque by the maintenance department. Among the improvements to the Fox River

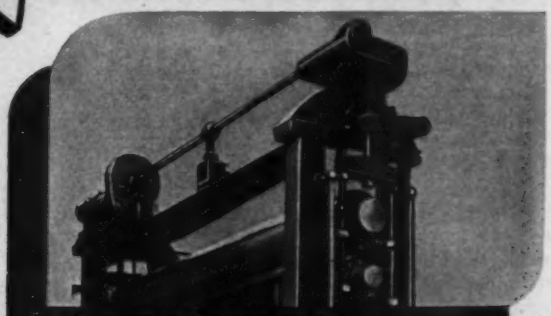
Right—Frank Waldo
Far Right—James B. Gaskins

4 Ways

TO ADD LIFE TO CALENDER STACKS . . . TO STEP UP THEIR PERFORMANCE . . . TO SIMPLIFY THEIR OPERATION . . . TO INCREASE SAFETY

B-C Calender Reversing Drive

The fastest and safest way known to eject calender plugs. Saves broke and eliminates a danger spot. Smooth pick-up of load without jerk on sheet or felt. Simple to operate and impossible to damage by incorrect operation. A MUST requirement for the modern mill.



B-C Electric Calender Lift

Push a button and each calender roll is raised to a safe clearance. Rolls cannot slip back and rust. All danger inherent in old handwheel method eliminated. This electric lift is the easy way, the positive way, the accurate way to handle this important operation.

B-C Accurately Aligned Rolls

Anti-friction bearings are needed for intermediate calender rolls. This keeps rolls running on dead center clear across the face, producing a perfect nip pattern and uniform sheet compression. Furthermore, anti-friction bearings produce greater cleanliness and keep journals cooler, with less air required.

B-C Uniform Pressure Doctors

B-C calender doctors improve the quality of your papers. Contact the rolls uniformly over every square inch of width. Easily adjustable both for amount and angle of pressure. Blades of flexible, non-scoring material . . . stainless steel, brass, hard rubber or composition.

Facts and figures on any Black-Clawson product available on request. Write, wire, or telephone for details. The Black-Clawson Co., Hamilton, Ohio. Operators of Shartle Brothers and Dilts.

Black-Clawson
CALENDERS

mill under his direction were the revamping of the Teulah mill including four new water wheels and new hydro-electric equipment, rebuilding of the No. 2 mill, construction of a filter plant and dam and a new boiler house. Mr. Small is still very active and will, no doubt, continue to keep a finger on the pulse of the paper industry.

◆

BRYAN MADE PRES. OF TRAFFIC LEAGUE

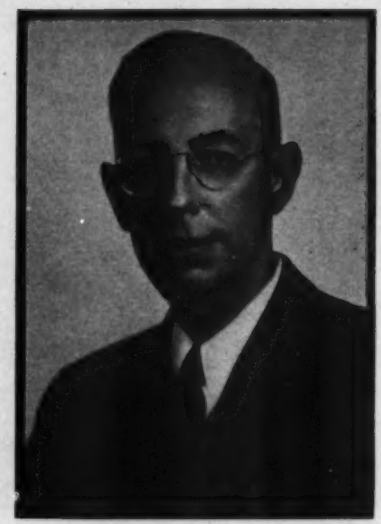
J. E. Bryan, general traffic manager of the Wisconsin Paper and Pulp Manufacturers' Traffic Association, Chicago, was elected president of the National Industrial Traffic League at its two-day annual meeting in New York City, November 14-15. Others named were R. R. Luddecke, general traffic manager of Standard Brands, Inc., who was elected vice president and R. W. Campbell, manager of the traffic department, Butler Paper Corporation, who was elected treasurer.

Regional vice presidents include R. W. Poteet, New England; Porter L. Howard, Philadelphia; C. F. A., Kenneth A. Moore, Detroit; W. T. L., Carl Giessow, St. Louis; A. L. Reed, Dallas, Southwestern; M. M. Emmert, Atlanta, Southeastern; C. T. Vandenover, Minneapolis, Northwestern.

AMERICAN ENGRG. ADDS TO PERSONNEL

Two new appointments have been announced by the American Engineering Company, Philadelphia.

Now treasurer of the Philadelphia organization is E. W. Sharninghausen, formerly purchasing agent for the company. Mr. Sharninghausen had been connected with the Otis Elevator Company for a number of years, prior to his association with the American Engineering Company. He will continue to serve as director of purchases.



E. W. Sharninghausen

C. E. Harrison

In addition, it was announced that C. E. Harrison, vice president of the American Engineering Company, has been appointed general manager. Mr. Harrison, associated with the American Engineering Company since 1913, will now have general supervision of the entire activities of the company in addition to his duties as vice president.

◆

▸▸▸ *President W. C. Buchanan,* of the Globe Steel Tubes Company, Milwaukee, Wisconsin, was elected a member of the board of directors of the Allis-Chalmers Manufacturing Company at a recent meeting of the latter company's board of directors.

◆

▸▸▸ *L. G. Atkinson,* associated with the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, since 1933, is now manager of a new section of the circuit breaker sales department of the company. Mr. Atkinson, a graduate of North Carolina State College, will handle sales of small De-ion circuit breakers.

◆

ARMCO PROMOTES TWO IN SALES DIV.

The American Rolling Mill Company, Middletown, Ohio, has announced two major promotions in its sales division.

J. A. Ingwersen has been named manager of the sheet and strip sales division and F. E. Wortley has been promoted to manager of midwestern sales, succeeding Mr. Ingwersen. Both

COTTRELL PROCESS OF ELECTRICAL PRECIPITATION

universally recognized as a standard method of removing

DUST, FLY ASH, FUME, MIST & FOG *from* GASES

28 years of research development and operating experience by the affiliated Cottrell Companies throughout the world is incorporated in the

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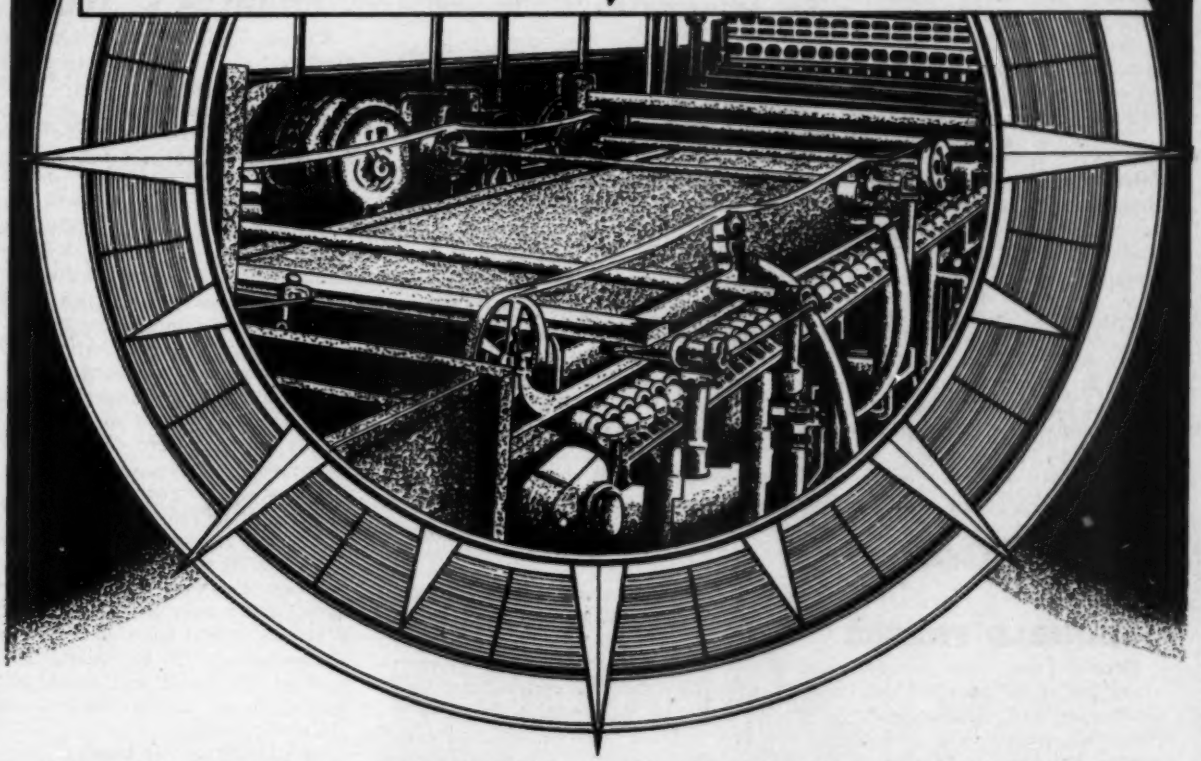
PAPER MAKERS *Depend On* DU PONT



From the progressive and long established producers of New England to the new mills of the South — from East coast to West — paper-makers throughout the nation *depend on* Du Pont.

They know that years of contact with the paper industry enables Du Pont to offer a complete line of acids and processing chemicals to exactly meet their needs.

They know, too, that Du Pont research assures them the competitive advantage of *first use* of the latest developments in paper-making chemicals — that Du Pont makes available tomorrow's chemicals today.

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of these men have had long and successful careers in sales work and have been connected with Armco's sales division over 15 years.

Mr. Ingwersen, after several years of newspaper work, entered the employ of Armco in 1923 in the personal relations division, later becoming salesman, assistant manager of the ingot iron sales section, manager in charge of hot and cold rolled sheets and finally manager of midwestern sales. Mr. Wortley joined Armco in 1912 as salesman of the New York District, later being transferred to Pittsburgh where he became manager in charge of ingot iron sales. He was named assistant manager of midwestern sales in 1939.

◆

▸▸▸ *R. N. Miers* has been appointed eastern district engineer of the Allis-Chalmers Manufacturing Company's steam turbine division. His new headquarters will be at the company's Boston office.

◆

▸▸▸ *J. E. O'Connell,* formerly sulphite superintendent of the Lake St. John Pulp and Paper Company, Dolbeau, Quebec, is now sulphite superintendent at the Kenogami (Quebec) mill of Price Brothers.

Necrology

DONALD FRASER

Donald Fraser, vice president and a member of the board of the Fraser Companies, Ltd., Edmundston, New Brunswick, passed away suddenly November 15. He was 73 years of age.

Mr. Fraser was born in Aberdeenshire, Scotland, and had accompanied his parents to Canada when a boy. His father, the late Donald Fraser, Sr., was the founder of the Fraser interest. In addition to his interests in Fraser Companies, Mr. Fraser was a director of the Rolland Paper Company, Montreal.

Surviving Mr. Fraser are his widow, two sons and one daughter. The eldest son, Donald, is on the Fraser Companies staff at Plaster Rock, and the other son is a student at Mount Allison University, Sackville, N. B.

◆

▸▸▸ *James A. Greenlee,* vice president and Chicago manager of the Kalamazoo Vegetable and Parchment Company, Kalamazoo, Michigan, passed away November 28 in Chicago. Mr. Greenlee was 60 years old and is survived by his widow and a daughter.

ARTHUR D. COFFIN

Arthur D. Coffin, chairman of the board of C. H. Dexter & Sons, Inc., Windsor Locks, Connecticut, passed away November 20 at the age of 72. Mr. Coffin was a former president of the American Tissue Paper Manufacturers' Association.

Born in 1868, Mr. Coffin was educated in Windsor Locks and entered in the employ of C. H. Dexter & Sons soon after graduation. He became a partner in the firm and eventually became president and treasurer. In 1936 he became chairman of the board of directors.

Besides his son, Dexter Drake Coffin, who now heads the firm, Mr. Coffin is survived by two grandsons and one sister.

◆

WILBERT J. AUSTIN

As this issue goes to press it is learned that among those killed in the tragic air crash at the Chicago airport was Wilbert J. Austin, president of The Austin Company, Cleveland. The crash occurred the evening of December 4 when the air liner carrying sixteen passengers stalled in its glide toward a landing at the airport. Mr. Austin was widely-known throughout the paper industry as well as in general industrial circles and his sudden passing will be a shock to many. He was 64 years old.

◆

▸▸▸ *Douglas H. Parker,* widely known in the Canadian paper industry, passed away November 22 at Grimsby, Ontario. He was 58 years of age. Mr. Parker had been associated with the Thunder Bay mills at Port Arthur, Ontario, and had been resident manager of the Powell River Company at Powell River, B. C. He also held the post of general manager of the Abitibi Power and Paper Company mill at Iroquois Falls. He is survived by his widow and three children.

◆

DR. FREDERICK JAHN

Well known in European paper circles as well as in this country, Dr. Frederick Jahn, managing director of the Swedish Paper Mills Association, passed away recently in Stockholm, Sweden. He was 52 years old.

Dr. Jahn had been manager of the Swedish association since 1917 and was also manager of the Swedish Paper Mills Company in addition to being a member of the Swedish General Export Association. At one time Dr. Jahn was editor of *Svensk Papperstidning.* He aided in the compilation of the Brusewitz Directory.

▸▸▸ *Colonel Jenness K. Dexter,* for half a century one of the leading paper mill supply operators in Springfield, Massachusetts, passed away in Springfield November 28 at the age of 88. Mr. Dexter started his paper industry career with the Massasoit Paper Company, later becoming a partner in a new paper business. He formed the J. K. Dexter Company and later organized the Dexter and Bowles Company, paper mill suppliers. Colonel Dexter is survived by one son.

◆

CHARLES L. ALLEN

Charles Lucius Allen, chairman of the board of Norton Company and its general manager for forty years, passed away November 4 at his home in Worcester, Massachusetts. The well-known industrialist was 82 years of age.

Born in Worcester in 1858, Mr. Allen was educated in the Worcester schools and began work as a shoe clerk soon after graduation from high school. In 1881 Mr. Allen began work with the Norton Company as a bookkeeper. When the Norton Emery Wheel Company was organized in 1885, Mr. Allen was made its general manager and it was not until 1933 that he put aside the reins of active management.

Mr. Allen became secretary and a director of the company in 1892 and in 1912, its treasurer. When the Norton Company and the Norton Grinding Company were merged in 1919, Mr. Allen was elected president. When he retired from administrative leadership in 1933 he became chairman of the board and remained a leading figure in the business until his recent passing.

In addition to his business affairs, Mr. Allen was also prominent in civic enterprises. He was a life member and trustee of the executive committee of the Worcester Polytechnic Institute, a member of the National Economic League, American Museum of Natural History, Foreign Policy Association, New England Council, Worcester Natural Historical Society and a host of other groups. Mr. Allen also sponsored worthy movements in safety work and Y.M.C.A. and Boy Scout organizations. He was, for several years, a member of the Parks and Recreation Commission. In 1931 Mr. Allen was decorated with the Order of Vasa at the direction of the King of Sweden for his contributions to the welfare of Swedish immigrants to America. On this occasion he received congratulatory messages from Calvin Coolidge and Herbert Hoover.

Mr. Allen is survived by a daughter, a sister and a brother.

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WITH FOURDRINIER SAVE-ALL TROUGHS OF MONEL...

This durable metal retains a smooth clean surface, reduces accumulation of fibre and slime!

INCREASED fibre recovery and lower operation costs! That's what paper mills accomplish with fourdrinier save-all troughs and white water collectors of Monel.

The smooth surface of Monel trays and troughs conveys fibre, fillers, and white water without heavy loss due to accumulation or lump-formations. The Save-All filter connected with the white water system can, therefore, recover fibre at optimum efficiency.

Because Monel is strong and rigid, this equipment is sturdy yet light in weight. It resists corrosion and pitting by acid or alkaline paper stocks and white water, thus assuring maintenance of a smooth, clean surface.

Write for Bulletin C-3, "Monel in Pulp and Paper Mills." For information on welding and soldering ask for Bulletin T-2. Address:

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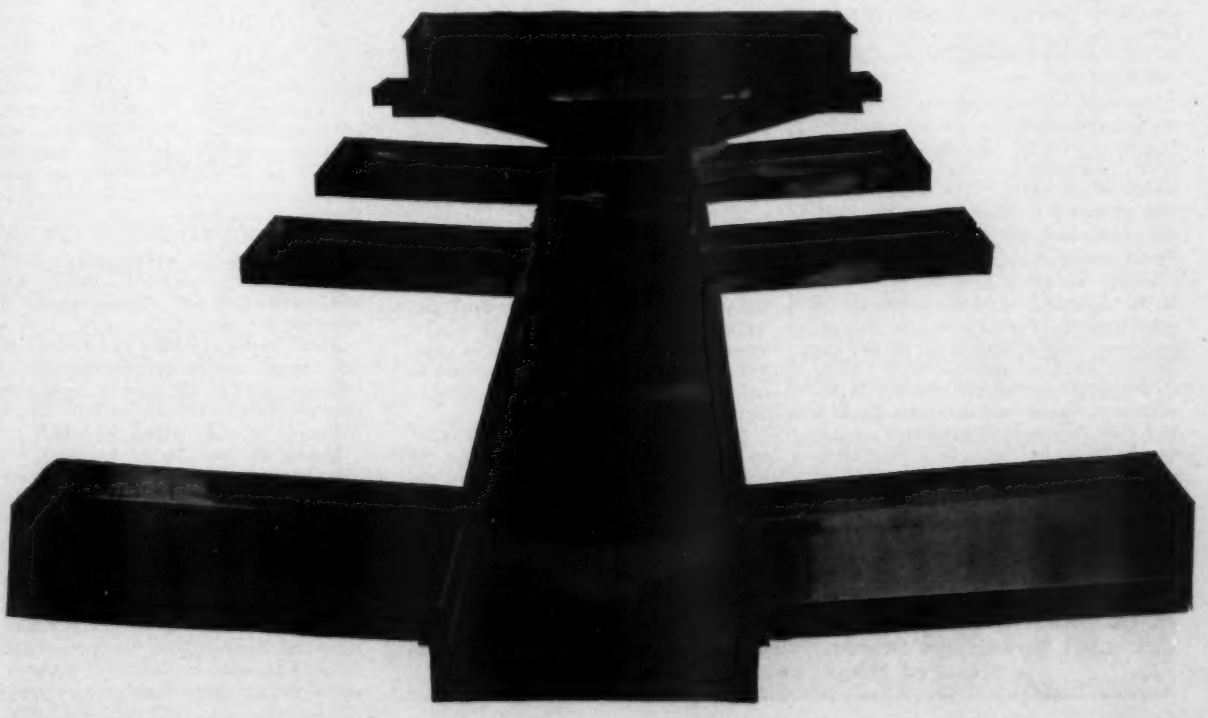
Fourdrinier Save-All troughs, pans and white water collector trough welded from Monel by the Berkshire Sheet Metal Works, Pittsfield, Mass.



Convention Papers . . . Abridged

Forced Circulation and Direct Heating in Sulphite Digesters

SVEN FAHLGREN[1], Chemical Engineer

The Wallin & Svensson circulating system for sulphite digesters, which permits direct heating and forced circulation without direct contact between steam and chips, is very simple and inexpensive. No pumps or other moving parts are needed. The system consists of: one circulating apparatus for each digester, one acid accumulator, and necessary pipe lines and valves between the digesters and the accumulator.

The circulating apparatus is made of stainless steel. It consists of a circular suction strainer placed in the bottom part of the digester and a vertical pipe line or raiser connected to it and attached to the side wall of the digester. Two steam nozzles are located in the bottom part of the raiser. In the upper part are two injectors connected to two nozzles through which sulphur-dioxide is injected together with steam from the main steam line.

The acid accumulator is built like a digester and has a volume of 25 or 50 per cent of the largest digester's volume, depending on the number of digesters and the quality of pulp wanted.

After filling the digester with chips which are evenly distributed and packed, the cooking acid is added.

The cooking acid is composed of 75-85 per cent fresh cooking acid, about 15 per cent acid of high temperature from the acid accumulator, and possibly 5-10 per cent acid from one of the digesters in line. Fresh cooking acid is added first in order to get the chips thoroughly impregnated with fresh acid.

The most common procedure is to bring the temperature up to 230-240 deg. Fahr. in about 3-4 hours. After that, the temperature is controlled according to the desired quality of the pulp. The total cooking time is usually 10-13 hours, but the plant can be dimensioned for either longer or shorter time.

During the entire cook the upper part of the digesters and the accumulator are interconnected. From the top of the accumulator a pipe line leads to the gas injectors, which are connected to the nozzles in the upper part of the raiser. This arrangement makes it possible to obtain a very valuable automatic transfer of sulphur dioxide from digesters with a surplus to digesters which are in an early cooking stage.

An automatic regulating valve releases the surplus gas, preventing the pressure in the digesters to exceed the fixed maximum. Another regulating valve regulates the gas flow from the accumulator to the circulating apparatus, this to prevent the pressure from dropping below a fixed minimum.

With the cook finished the digester is cut off from the circulating system and relieved the usual way.

The experience gained in mills operating the W & S system shows that, depending on local conditions of cooking, considerable improvements and saving have been effected.

One mill, for instance, manufacturing rayon pulp showed a saving in steam of 25 per cent, in sulphur of 10 per cent, and with a total cooking time of 12-13 hours, at a maximum temperature of 285 deg. Fahr. gave a yield of approximately 6.5 lb. of unbleached pulp per cu. ft. digester volume.

Through the pre-steaming of chips and elimination of air from the digester (which takes place when using the chip packer) and through excellent circulation in the digester, variation in temperature throughout the digester is very small. In a 19'x59' digester, the temperature difference between various points in the digester does not exceed 3 deg. C.

(1) Aktiebolaget A. Ekstroms Maskinaffar, Stockholm, Sweden.

The Trend of the Newsprint Industry In the United States

GEORGE D. BEARCE, General Manager
Maine Seaboard Paper Company

Newsprint is one of the important branches of the entire paper industry in the United States and is the third ranking grade in tonnage and value of product. The modern newsprint mill also represents a large capital outlay of approximately $35,000 per ton of capacity for large expensive machinery and equipment as well as permanent buildings of the best industrial construction. A 300-ton mill is considered to be the smallest unit that will produce economically so the investment in a modern newsprint mill will be at least $10,000,000 without timberlands. Since a newsprint mill requires about a one man per day per ton of paper this means that for each man employed an amount of approximately $35,000 must be invested.

The development of the newsprint industry has paralleled to a large degree the progress of the publishing industry in the United States. Twenty-five years ago the newsprint paper industry was a major factor in supplying the United States newspapers. In the year 1913 the tariff was entirely removed from newsprint paper and as a result many of the large manufacturers sought locations where they could obtain their pulpwood supply and power at a more economical figure. The large forest resources and the exceptionally fine water power sites, particularly in the Provinces of Quebec and Ontario, provided an excellent and fertile field for this development. During the years that followed the removal of the tariff on newsprint there was a major movement of the newsprint industry into Canada and where cheap power was developed and an ample supply of pulpwood available. A comparison showing the changes in the productive capacity of United States and Canadian newsprint paper industry as well as foreign imports is shown by the following figures.

PRODUCTION	1913 (Tariff Lifted)	
United States	1,300,000 tons	88%
Canada	350,000 tons	12%
Total	1,650,000 tons	
	1938	
United States	820,000 tons	22%
Canada	2,893,000 tons	78%
Total	3,713,000 tons	

Overseas imports practically nil in 1913
Overseas imports 311,000 tons in 1938—
or 8½% U. S. & Canadian products.

In 1926 there were 38 companies listed by the News Print Service Bureau as producers in newsprint paper in the United States. In 1938, twelve years later, there remained of these 38 concerns only 9 regular newsprint manufacturing companies. Five made some newsprint together with other grades of paper, while the remaining 24 companies had either abandoned the manufacture of paper entirely or completely changed to other grades. There has only been one new newsprint mill established in the United States between 1926 and 1938.

In order that the newsprint mills now established in the United States equip themselves to compete with foreign plants, it has been necessary to modernize their mills in every possible way.

About twenty-five years ago a speed of 600 ft. per minute was considered quite fast, but most of the modern mills now operate between 1100 ft. and 1300 ft. per minute.

During the past twenty or twenty-five years improvements in quality have been a big factor in the newsprint industry and definite results have been attained in this field. Less than a decade ago the press room operators considered that satisfactory operating results were attained if they had only one break every three to five rolls. At a recent conference of the mechanical departments of the American Newspaper Publishers Association in June, 1939, it was reported that one paper manufacturer's record

Abridgments of papers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 19-22, 1940, appeared in the March, April, May, June, August, September, October, and November issues. This is the concluding installment of these abridged papers.

There's more to POWELL QUALITY than meets the BUYER'S EYE!

Here's a "Big Gun" in Our Own Preparedness Campaign, Making Powell Valves Safe for Severest Temperature Services.

You Need More Than a Photograph of the Finished Product to See ALL the Qualities that Make Powell Valves Uniquely Able to Better Serve the Mill Owner.

What will happen to a metal or alloy when subjected to intense temperature changes is a problem of primary importance when designing valves for extraordinary services. The degree of expansion or contraction which takes place under given conditions has everything to do with the valve's operation, performance, and all-over economy.

One of the many pieces of quality-injecting equipment "behind the scenes" at Powell is this intricate laboratory trouble-shooter, called the Dilatometer. With unfailing accuracy, it obtains critical points of metals when subjected to temperature and determines co-efficients of expansion . . . two vital factors in anticipating the true behavior of Powell Valves when eventually put into service on your property.

It's just one link in a long chain of unseen operations underlying the greater inherent quality of these preferred products, but the Dilatometer is one of the reasons we can say so confidently . . . "there's more to Powell quality than meets the buyer's eye!" Won't you give it a thought next time you're in the market for the best valve performance money can buy?

THE WM. POWELL COMPANY
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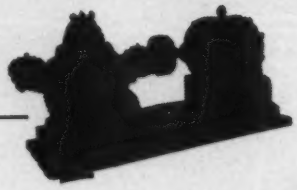
POWELL VALVES

?

HOW TO KNOW WHEN TO REPLACE A PUMP...



What pumps in your mill have outlived their efficiencies and are causing excessive power consumption? Warren engineers can help you answer that important question. For they are trained through long experience to spot power-wasting pumps, to get and analyze the true facts on pump performance. Then, should power losses be uncovered, these engineers are equipped to recommend pump replacements on the basis of actual cost analyses . . . It's good business and sound engineering to check Warren on your pumping problems.

WARREN PUMPS

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WARREN STEAM PUMP COMPANY, WARREN, MASSACHUSETTS

showed that paper averaged fifty rolls per break. This was based on a consumption of 600,000 rolls that were used on the presses over a period of nearly a year.

Much has also been done by the newsprint industry in the quality control of their groundwood and sulphite pulps. This has enabled the mills to produce pulp for the paper machines which in turn makes a sheet of newsprint with physical characteristics that are required.

The newsprint industry presents some very exceptional problems for management, since the mills that make all of their own pulp must start to get their wood supply two years ahead of time and finally deliver the newsprint rolls to the publishers' railroad siding. The correct management of sizable blocks of timberland is also important because of the fire hazards and possible destruction due to insect pests.

Another problem that confronts management which is particularly important at the present time is the question of personnel relations. The newsprint paper industry in the United States is and has been for some time largely unionized. The industry has been particularly fortunate in that the two principal unions with which it deals have international officers of experience and sound judgment who recognize the problems in the industry and advise their members accordingly. They understand that the success of their union depends to a large degree upon the progress of the entire industry and its separate units and that a reasonable relationship must be maintained between wages, selling prices and profits if the industry expects to survive. The wage rate in newsprint manufacturing is one of the highest in the entire United States paper industry and the average of the latter has shown a steady upward trend up to the present time.

Newsprint is one of the lowest cost papers commonly used and its price influences many other similar grades of paper and, in fact, the whole price structure of the paper industry. Low price newsprint came into existence upon the development of low cost groundwood pulp about the year 1900. With the exception of a short period soon after 1920, when the supply was not equal to the demand, the price of newsprint paper has always been at a reasonable figure.

From the standpoint of management the problem of successfully operating newsprint mills in the United States is becoming increasingly difficult. The price of the finished product "newsprint" has not increased in proportion to wages and the raw products it requires in the manufacturing processes. While it is true that newsprint has advanced in price to some extent, it is now only a little over the break-even point.

Newsprint is and doubtless will be used for many years to come as a major raw product of the newspaper publishing industry. Foreign supplies and newsprint paper may be available at a lower price and have been purchased from Sweden, Finland and other European countries at a price much below the prevailing market and even below the United States cost of production. The low wage rates and cost of materials in these countries enables them to undersell United States mills by at least $5 per ton, thus creating a difficult marketing problem. There are times when this source is not entirely dependable, therefore, it is reasonable to expect that the consumer of the produce of the newsprint industry will favor a reasonable degree of domestic product.

A discussion on newsprint would not be complete without a few comments on the possible development of this industry in the South. It may take three to five years to find out the economical way to make paper from southern woods that will equal the newsprint made from northern spruce. The cost of manufacturing this product and delivering to the market will also be a factor in the development of a southern newsprint industry. There are many technical and operating problems that will doubtless arise in connection with making newsprint out of southern pines. It should be possible to solve all of these problems in a reasonably economical manner, but this may take considerable time to do it on a commercial basis. If and when one mill has definitely proved that this grade of paper can successfully and economically be made from southern pine, then the further development of the industry in the South will probably progress if good mill sites, ample pulpwood at reasonable cost and economical power facilities are available. Before there is too great an expansion, the markets for newsprint must be developed.

Unless there is an exceptional development in the newsprint industry in the South, it is probable that the consumer of news-

An Object Lesson IN

AMERICAN INDUSTRIAL SELF-SUFFICIENCY

The war that has bottled up the wood pulp supplies of Europe has also caused the impounding of Australian wool. But Canada and the United States can produce enough wood pulp to make the New World independent of the Old; together with the nations of South America they grow enough wool to meet all requirements of the Western hemisphere. Wherever American mills are most efficiently and most economically converting pulp into paper, their machines are equipped with HAMILTON FELTS.

Eighty years experience governs the selection and blending of the wools that enter into the manufacture of Hamilton Felts. The pattern of the weave, the thickness of the nap — every detail of material and workmanship contributes to the efficiency of Hamilton Felts in presenting dryer webs to the drier.

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Hamilton Felts

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print paper will be obliged to look for about 80 per cent of his product in Canada and in foreign countries because there is and always will be a disadvantage to United States newsprint manufacturers on account of the somewhat low wages, low cost pulpwood and materials in foreign countries. Canada has a large surplus of productive capacity and most of its mills are modern and efficient. Finland has greatly expanded its newsprint industry during the past few years and is now one of the most important sources of this grade of paper. The picture is not particularly interesting to the United States newsprint manufacturer, but the facts apparently indicate that the future trend points to a further contraction rather than an expansion of the industry in the year to come unless the development of newsprint in the South exceeds all expectations.

Prevention of Oxidation and Rancidity in Paper with Oat Flour

SIDNEY MUSHER, President
Musher Foundation, Inc.

In 1939, about 150,000,000 pounds of food products were directly processed with oat flour, and the protective value of the cereal antioxygens has been shown in some thirty articles published as a result of about twenty fellowships established by Musher Foundation, Inc., at State and Federal laboratories.

The application of oat flour to paper and paperboard used for the packaging of oxidizable food compositions is a recent development [U. S. Patent, 2,038,752 (April 28, 1936)]. The treatment of the food wrapper with oat flour has the distinct advantage of not requiring special labeling which is particularly important in view of the present strict labeling requirements.

The oat flour is applied as a surface sizing in an amount ranging from 0.5 to 2 per cent by weight on paper and from 0.5 to 0.75 per cent by weignt on paperboard. Its addition to the beaters is undesirable since that portion of the antioxygens which are water soluble is lost, if a beater sizing is employed.

A solution is prepared containing about 5 to 10 per cent oat flour, and this solution is used in the tub or at the calenders together with other sizing ingredients, holding the oat flour in suspension with agitation or continuous circulation. The oat flour may also be applied as a spray on the fourdrinier wires at the wet end of the paper machine.

Since oat flour contains over 60 per cent total starch with gelatinization at about 160 deg. Fahr., the lowest possible temperature should be maintained during application. The presence of 0.5 per cent cooked oat flour or cooked starch in the tub will assist in holding the uncooked oat flour in suspension.

The oat flour treated paper or paperboard may be paraffined or oil impregnated, and even though the oat flour film is completely covered by the paraffin or oil, the antioxygenic effect is retained.

Oxidation and rancidity begin most frequently at the exposed surfaces of a food and gradually penetrate into the center portions, where there is contact with the wrapper. The wrapper is, therefore, treated on that side which comes into direct contact with the food, whether the contact be complete or continuous as in the wrapping of butter or incomplete or discontinuous as in the packaging of crackers.

With respect to fresh market milk, it is not generally known that oxidation is a problem, and yet the development of an oxidized flavor in milk is one of the most serious problems facing the milk industry.

Treated paper bottles made by applying 0.28 per cent oat flour as a surface sizing on board and then fabricating the bottles and paraffining as usual, even within a 24 to 72 hour period, materially retard tallowy and oxidized flavors.

Similarly, oat flour treated paper liners and cartons may be used in the packaging of market cream, ice cream, cream cheese, and whipping cream.

The oat flour treatment may also advantageously be applied to parchment, greaseproof, and glassine paper for the packaging of lard, margarine, and hams as well as to oil impregnated and waxed sulphite papers used for the packaging of pork loins, beef, mutton, and other fatty meats, where yellowing of surface fat, rancidity, and loss of fresh flavor are problems.

The application of oat flour as a surface sizing on paper and paperboard has been found of value for the packaging of toasted whole wheat cereals, coffee, candies and confections, essential oil flavored gelatin desserts, bakery products including cartons for

Appleton Wires are Good wires

Appleton Wire Works, Inc.
Appleton, Wis.

CURBS CORROSIVE ACIDS

You know what a curb bit does to an unruly horse—gentles it—helps bring it under control.

Tellurium Lead has the same effect on corrosive acids. From many different industries come user reports telling how this lead has subdued trouble-making acids—reports which state that Tellurium Lead has prolonged the life of equipment, even when the temperature has approached the melting point of the metal.

Another highly important property of Tellurium Lead is this: *It toughens under stress.* When rolled, stretched or hammered, it actually becomes stronger. As a result, turnover points and joints are less subject to cracking. Furthermore, where vibration occurs, this capacity to develop latent strength minimizes buckling and creeping. It also gives Tellurium Lead improved resistance to fracture due to repeated heat changes.

Tellurium Lead of our manufacture is time-tested St. Joe chemical lead alloyed with a small quantity of tellurium. It gives the advantages of this well-known chemical lead plus important new ones. Yet now it costs only a fraction of a cent more per pound than chemical lead. Available in sheets, pipe and coils. For further facts, write our nearest branch.

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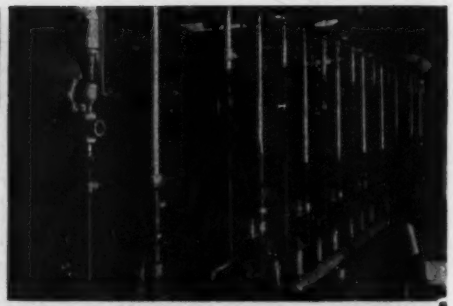
Why the old steam fits are making way for JOHNSON ROTARY PRESSURE JOINTS

IN the Johnson Rotary Pressure Joint, operating men have found the modern, trouble-free way to admit steam to the rolls of paper machines—a rotary joint that requires no packing at all; no oiling; no adjustment. Still more important, it is a joint that compensates for lateral and angular misalignment, ending the worst fault of old style "steam fits."

Here you have the proved solution of "steam fit" problems in a rotary joint that provides in its head construction the simplest and most effective way to obtain modern syphon pipe drainage of rolls. Operating records prove that savings will more than pay for the changeover. Ask for latest bulletin.



LOTS OF JOINTS—LOTS OF SAVINGS
Many paper plants now have more than a hundred Johnson Joints in service.

Product of The Johnson Corporation
845 WOOD STREET, THREE RIVERS, MICHIGAN, U.S.A.

doughnuts and pastries, and similar foods.

In some cases the oat flour treatment has been found of particular value in retarding the development of a "cardboard" odor which sometimes contaminates the food.

Since the oat flour is applied as a surface sizing, and since the surface of the paper or paperboard is subjected to the highest temperature during drying, it is expected, that the oat flour will not increase bacteria count.

Circulation and Storage Of Kraft Pulp

G. A. PETROE, Development Engineer
Mathieson Alkali Works, (Inc.)

Some of the problems encountered in connection with high density bleaching are that the stock is so heavy that it cannot be pumped out of the bleachers, the intensity of the oxidizing reaction is such, and the mass of water present for the absorption of heat is so small, that it sometimes causes the stock to overheat without the addition of steam, and the mixing of pulp and treatment chemicals or pulp and steam is comparatively difficult. Washer operation must be carried on in such a manner that high density material is produced at all times, and the power consumption of a unit of this type is greater than the power consumption of a low density unit, and possibly more costly than the increased steam required to heat the additional water in a lower density material, particularly so, if the steam used is exhaust steam.

Studies in the design of pulp bleaching plants utilizing low density horizontal rectangular retention chests with provision for the efficient maintenance of circulation, agitation and volume adjustment, serve to indicate that low density operation possesses several advantages.

1) The capital investment required for the installation of a plant of this type is reduced approximately 30 per cent in five-and six-stage plants of 100 to 150 tons daily capacity.
2) A substantial reduction is made in the power required to operate a unit of this type.
3) The size of the buildings required, consisting as they do of a building structure on the upper portion of the chest assembly and a lean-to shelter for the pumps, located on the ground floor, provide for buildings of minimum volume.
4) Alterations to the chest volumes, and hence the retention periods in the chest, provide a means of adjusting a plant to the desired operation capacity from 150 to 175 tons per day with equivalent chemical treatment.
5) Complete shutdowns for radical changes, or, shutdown period can be made without the installation of additional equipment for this purpose.
6) Complete inspection of the material in process permits corrective chemical additions to be introduced at various points in the chest during the reaction period, to compensate for irregularities which may take place in the bleachability of the raw stock or in its succeeding treatment.
7) Plant operations at low density are simplified, in that some of the difficulties inherent in operation at the high density are eliminated.
8) There is a lessened possibility of injuring the pulp by exposing it to either injurious chemical concentrations or local overheated zones.

In order to study the character of the pulp circulation in rectangular chests, an experimental program was outlined by the Mathieson Alkali Works (Inc.), and arrangements completed with the Bayless Pulp & Paper Corporation at Austin, Pennsylvania, for the use of Bellmer and accessory equipment for the purpose of studying this circulation.

The Bellmer engine was removed from the Bellmar unit and a wooden box installed at the entrance of the center ramp of such size as to accumulate a pulp inlet and a 10-hp., impeller type agitator, which unit was loaned for this experimental purpose by the Patterson Foundry & Machine Company of East Liverpool, Ohio.

A 4 in. x 6 in. stock pump, loaned by Buffalo Pumps, Inc., of Buffalo, New York, for the purpose of conducting these tests, was located in the basement of the building so as to receive the stock from a suction pipe located at the downstream side of the overflow weir and discharge this stock back to the inlet box, located in the front of the Bellmer inlet ramp through a piping arrangement which permitted imposing a pressure of 10 lb. per square inch on the stock at the Bellmer inlet.

Early in the pulp circulation experiment

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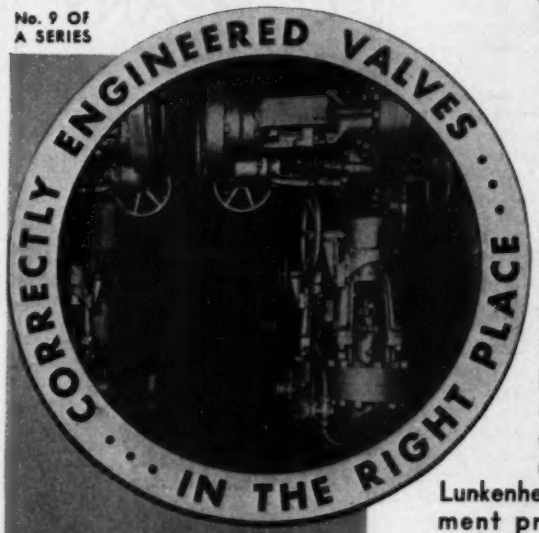

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it was demonstrated that the double return ramps of a Bellmer unit were impractical for the intended purpose as pulp circulation was selective through the ramp offering the least resistance to flow, although, if the flowing ramp were shut off, no difficulty was experienced in restoring the dormant ramp to active flow.

As a means of eliminating the difficulties attendant on the use of the double return ramp, a bulkhead was constructed over one of the Bellmer passages so as to utilize only the inlet ramp of the Bellmer, consisting of a chest 6 ft. 10 in. wide x 6 ft. 6 in. deep x 44 ft. long, terminating at a boat end, and one return ramp 4 ft. 3 in. wide 6 ft. x 6 in. deep x 28 ft. long, terminating at the overflow weir.

Southern kraft stock was de-fibered in a beater and transferred to the modified Bellmer chest at a consistency of 2½ per cent, which consistency was gradually reduced by the use of vacuum-operated leaf filters to the desired operating consistency.

During this experimental run the stock was reduced to a consistency of 7½ per cent for twenty-four hours for observation, and after obtaining data on circulation characteristics under these conditions, the consistency was restored to 6 per cent in order to avoid jeopardizing the experimental results.

Pulp circulation was carried on at various times without the aid of the agitator installed at the inlet of the chest, and it was noted that the pulp circulation was unimpaired at this time, although, the pulp surface was lumpy and not as smooth on the surface. These lumps obviously would drain very rapidly, hence, it was concluded that this agitator is necessary on a chest used as a retention chest for reaction purposes, but would not be necessary in a chest used for storage duty only.

Conclusions to be taken from this test present ample evidence that if a stock of a density of from 6 to 7½ per cent is charged in a horizontal rectangular chest, that circulation, either for the purpose of storage or as a reaction period, is entirely practical following the procedure outlined, providing the following design features are rigidly adhered to.

1) Force shall be applied to the incoming stock, either from a pump or from a head of stock so as to insure uniform stock movement and shall preferably be introduced through a trapezoidal-shaped member so that the forces contributed by the incoming stock will be exerted against the body of stock stored in the chest.
2) Stock chests shall be tile lined, preferably with large tile with minimum width joints, so as to preserve the difference between the coefficient of friction of the surface as compared to the coefficient of friction within the stock body itself. The pitch of the chest floor shall preferably coincide with the average hydraulic gradient of the stock under treatment, which for 6 per cent consistency material is equivalent to about 0.5 in. per ft. This pitch will provide a uniform stock area throughout the entire chest length and greatly facilitate wash-down service.
3) In the installation of chests over 50 ft. long, zone type agitation equipment shall be installed at various points throughout the chest with the impeller placed at an angle of 30 deg. from the horizontal so that stock is driven by the impeller wheel from the agitator side of the chest to a point at the center of the chest bottom and bounds to the opposite side of the chest so that in effect, the stock is turned over upon itself. Alternate to this, provisions may be made for adding a spray of water at the top of the stock and a drain at the chest bottom in order to balance the amount of water which has drained from the stock during its transmission to this point, and thereby maintain a flowable stock consistency in the pulp mass.
4) The overflow weir on a chest of this type is to be equipped with generous fillets on the upstream side of the weir and preferably fitted with water inlets at this point so as to discharge the stock over the weir at a consistency of 5 per cent or less, although, 7½ per cent material discharges over the weir with a very slight flow irregularity.

A chest used as a simple storage vessel can be installed without the use of overflow weirs, as in this case the stock can be taken directly to the discharge point and to the pump mechanism used for circulation or transmission. This overflow weir, which serves to adjust the retention volume of a chest so as to govern plant capacity when the chest is used for reaction purposes, shall preferably be installed at an angle of 45 deg. from the horizontal, and to the discharge point in order to prevent the formation of a stock fillet at the base of the weir and the chest floor. Where dilution water is added at the upstream side of the weir, the dilution stream is preferably introduced at the intersection of the chest floor and the weir.

5) Circulation and agitation of stock in storage or under treatment need not be continuous but may be intermittent in order to effect economy in the power consumed during this period; for instance, if it is desired to store twenty tons of paper pulp stock, this may be accomplished by considering the installation of two ten-ton storage units, the circulation and agitation equipment of which is operated in alternate cycles as settling during the period of inert storage does not become a factor, and the entire pulp body goes into motion immediately upon starting the circulation equiyment.
6) The discharge end of the ramp may be tapered at an angle of about 30 deg. from the tank side and terminate in a radius conforming to the diameter of the discharge pipe, so as to prevent the formation of collars or dormant stock zones which would be formed by the selective flow of dense stock over the overflow weir.

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causes of circulation failure in stock may be attributed to the fact that some of the fibers and fiber bundles are coarse and heavy while others are fine and are charged with occluded air which holds them in suspension.

The use of a chest of extremely large cross-sectional area will permit the pulp inlet forces, which are intended to maintain circulation, to channel, due to the fact that the weight to be moved is great enough to permit shear in the pulp body so that a current of stock may flow within the stock body, the reduced surface friction of the stock against the size being overcome by the weight to be moved.

The chest, which is so designed that the inlet will permit settled or drained bodies of stock to accumulate, may be responsible for circulation failure, in that these bodies of stock will float into the circulation and lodge against a friction point or boat end.

The problem, then, of selecting a means of stock propulsion becomes a matter of selecting a unit capable of applying an adequate force against an established resistance, and it is logical to consider various types of self-contained pumps for the required duty, and restrict helicoids or screw conveyors in stock service to conveying duty, or mixing devices such as impellers for mixing service. The gain through this practice would be in the increased hydraulic efficiency, the reduced power consumption and a decided reduction in the capital investment required to equip a given unit for the necessary service.

In actual tests which were run of this problem, a pump with a suction connection 24 ft. long, a discharge connection equivalent to 50 ft. of pipe consumed less than 10 hp. for an equivalent pulp flow. This same unit, fitted with a well-designed pump with suitable suction and discharge connections, is calculated to accomplish the same degree of agitation with the expenditure of 4.75 to 5 brake hp. with a 7½-hp. motor connected for the service.

This circulation investigation was conducted by the Matheson Alkali Works (Inc.), and we wish to acknowledge our indebtedness to S. Bayless of the Bayless Pulp & Paper Corporation, M. M. Klosson of Buffalo Pumps, Inc., and E. M. Underwood of the Patterson Foundry & Machine Company for the loan of equipment used in conducting this test, the encouragment and sympathetic understanding of Harry K. Williamson, and the assistance and co-operation of our associates Vernon Woodside and Ralph Carr and James Brennan.

The Relation of Starch to Microbiological Problems In Paper Mills and Methods for Controlling Bacterial Growth

DR. ALEXANDER FRIEDEN, Technical Director, Stein Hall & Company, Inc.

The bacterial flora and fauna in starch are determined by chemical treatment to which the starch is subjected during its manufacture and by the environmental factors; i.e., the bacteria and molds present in the air and water in contact with the starch during its manufacture.

The effect of chemical treatment is to reduce the number of bacteria. The chemically treated starches, particularly the oxidized starches, contain less bacteria than the untreated starches. Washing, drying and grinding operations must be carried out in an efficient and modern way in order to keep down the number of bacteria due to environmental factors.

The types of microbiological growth that may be present in starch are divided into three classifications; namely, (1) general, including molds, (2) B coli and (3) Thermophilic bacteria.

Most of the bacteria in starch are of the first type. B coli are seldom present, and when present, indicate unsanitary methods of manufacture, while the number of Thermophiles will depend largely on the chemical treatment of the starch during its preparation.

The tendency is for the number of bacteria to decrease between the time of the manufacture of starch and its use in the paper mill. This is explained by the fact that part of the water in the starch is free water, and as this free water becomes saturated with the end products of bacterial life, the bacteria die off. As a result, when the starch reaches the mill, it is apt to have fewer bacteria than it had at the time is was prepared.

When the starch is used in the mill, bacterial growth may be prevented through (1) heat, (2) light, and (3) chemicals. To these, must be added the use of reasonable care in handling starch with particular emphasis on the use of clean equipment. The worker should be trained to rinse out the barrel or kettle after the starch is removed, to steam it for a few

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minutes, or to use water containing bacterial substances in solution.

The general cooking practice in the paper mill will destroy practically all bacteria except the Thermophiles. To control the growth of Thermophilic bacteria and to prevent contamination of starch cooks after they are prepared, chemical substances must be used.

The efficiency of a large number of chemical substances for controlling bacteria cooks has been studied and chief among these are fluorides, zinc salts, copper salts, boric acid and borates, benzoic acid, oxybenzoic acid and the benzoates, salicylic acid and the salicylates, phenols, such as phenol, cresol, resorcinol, formaldehyde or compounds yielding formaldehyde chlorine, chlorinated phenols, etc. These substances vary widely in their bactericidal or preservative efficiency. Some are highly effective for certain organisms while comparatively harmless for others. It is sometimes necessary to experiment with several different types in order to determine the most effective. Concentration is also an important factor.

A Method of Analysis Of Rosin-Wax Sizes

R. B. PORTER, JR.[1] and W. M. THOMAS[2]

It is the object of this paper to describe a titration method of size analysis that is particularly suitable for a rosin-wax size.

The general plan of analysis that has been developed is as follows:

(1) Research Chemist, and
(2) Asst. Research Chemist, Bennett, Inc.

1) A direct titration of a solution of the size in alcohol is made with caustic soda solution.

2) The size is then precipitated with acid, filtered and washed, dissolved in alcohol and again titrated with NaOH.

3) The ratio of the above results gives the percentage of free rosin acid neglecting the non-acidic or unsaponifiable portion.

4) The caustic soda having been standardized against the rosin used, total rosin is determined from the second titration.

5) The unsaponifiable portion is calculated from the average acid number of the type of rosin being examined.

6) Percentage wax is determined by difference between total precipitated material and total rosin.

A five gram sample of size is weighed into a 200 cc. flask or beaker, dissolved in 75 cc. of warm neutral alcohol, and titrated to the phenolphthalein end point with approximately half normal aqueous sodium hydroxide. A second five gram sample of size is weighed into a similar container, dispersed in 100 grams of distilled water, and strongly acidified with hydrochloric or sulphuric acid. The dispersion is then heated to 190 deg. Fahr. and maintained at this temperature for fifteen minutes, after which it is cooled until the rosin-wax mass solidifies. The dispersion is then filtered and the precipitate washed with warm water until the filtrate is neutral to litmus paper. The precipitate (including the filter paper) is then returned to the original container and dissolved in warm neutral alcohol. The solution is then titrated as in the first case. Free rosin acid is then calculated as follows:

$$\text{Per cent free rosin acid} = 100 \frac{V_1}{V_2 \frac{W_1}{W_2}}$$

where V_1 = volume of NaOH required in first titration
V_2 = volume of NaOH required in second titration
W_1 = weight of sample in first titration
W_2 = weight of sample in second titration

The alkali is standardized against the rosin used in the manufacture of the size so that the grams of rosin corresponding to 1 cc. of NaOH is known. Thus, this method is applicable only where the type of rosin in the size is known. Where it is unknown, it is necessary to separate the wax from the rosin and determine the acid number of the latter. The per cent total rosin is calculated from the expression,

$$\text{Per cent total rosin} = 100 \times \frac{V_2 \times \text{gm. of rosin per cc. NaOH}}{W_2 \times \text{total solids} \times \text{factor}}$$

The factor is defined as the fraction of rosin-wax mixture per unit weight of dry size or in other words, it corrects for the increase in weight caused by the reaction of abietic acid with NaOH. For a first approximation the value of this factor may be taken as .96. If the total rosin is approximately 80 per cent, a factor of .95 should be used, and if 60 per cent, a

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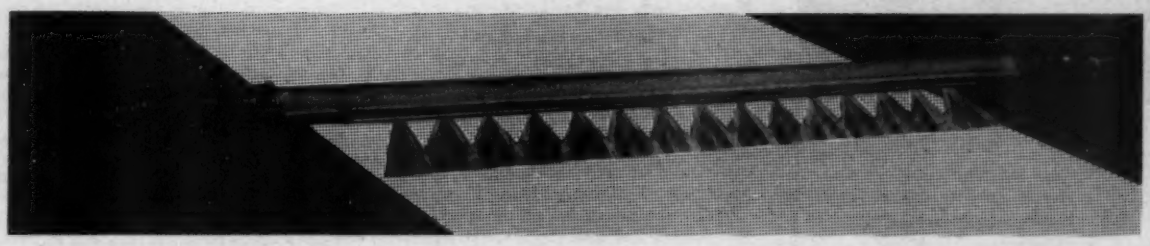

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factor of .96, and if 50 per cent, a factor of .97.

The percentage of wax is determined by subtracting the per cent total rosin from 100 per cent.

In this method, the free rosin as determined by titration is, in fact, free rosin acid. It does not include the unsaponifiable material present in most rosins. If this material is to be included in the results for the free rosin value, it can be calculated by a simple mathematical computation as illustrated by the following example:

Example of a size containing 52 per cent wax and 48 per cent rosin.

Basis: 100 gm. of dry size

By titration free rosin acid.....13.4%
Acid number of rosin.....163
Acid number of abietic acid.....185

$\frac{163}{185} \times 48 = 42.3$ gm. of acid present

$48 - 42.3 = 5.7$ gm. unsaponifiable material

$\frac{13.4}{100} \times 42.3 = 5.66$ gm. free acid present

$5.7 + 5.66 = 11.4$ gm. of resinous material

$\frac{11.4}{48} \times 100 = 23.7\%$ free rosin

There are some objections to this method of analysis of rosin-wax sizes: namely,

1) The acid number of all rosins is not the same.

2) Other materials besides rosin may effect the determinations.

3) The rosin is not completely precipitated or removed by the acid and filtration treatment.

Although these objections have some basis, they are not of a serious nature. The acid numbers of gum rosins used in the paper industry do not vary more than 2 per cent with the general average of 165, while the average value for FF wood rosin is 155. Other materials, such as secondary stabilizers, are present in such small amounts that their effect is not determinable by experimental methods. Experimentation has shown that the precipitation of the size with acid is complete to such a degree that any effect due to incomplete precipitation does not effect the utlimate results of the analysis.

Relation of Lignin Content To the Strength of Paper and Boards

II. Preparation of Pulps of Different Lignin Content By Chlorine Dioxide

C. V. HOLMBERG[1] and EDWIN C. JAHN[2]

Orienting experiments in which northern white pine mechanical pulp was delignified with chlorine water and 3 per cent alcoholic ethanolamine and also with chlorine dioxide were described in the previous paper of this series [Jahn and Holmberg. *Paper Trade Journal*, 108, T. S. 164-9 (Sept. 28, 1939)].

(1) TAPPI Graduate Fellow and (2) Professor of Forest Chemistry, New York State College of Forestry, Syracuse, N. Y.

The preliminary work showed that of the above two methods, aqueous chlorine dioxide was the easier and more convenient procedure for delignifying comparatively large quantities of mechanical pulp and gave a product with a higher degree of freeness.

Northern white pine mechanical pulp and sawdust and aspen sawdust were treated in a number of different ways: i.e., by varying the total chlorine dioxide available, by varying the time, and by adding fresh solution at different intervals.

About 0.6 to 0.7 grams of chlorine dioxide per gram of wood is necessary for delignification. The method of adding the aqueous solution of chlorine dioxide, whether in one batch or in successive additions over a period of days, makes no significant difference. Under the conditions used complete delignification of northern white pine mechanical pulp takes about eight days.

The rate of delignification at 4 deg. C. is much slower than at 20 deg. or 25 deg. C. There is little difference in the results obtained at 20 deg. and 25 deg. C.

Aspen wood (60-100 mesh) is delignified more readily by chlorine dioxide than is northern white pine and yields a holocellulose with a much greater retention of pentosans, the loss being 11.2 per cent for nearly completely delignified material (0.17 per cent lignin).

The greatest loss in pentosans occurs during the removal of the last few per cent of residual lignin.

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The sudden increase in pentosan losses during the removal of the last portion of the lignin with chlorine dioxide indicates that this part of the lignin is in intimate association or chemical combination with a part of the pentosans.

In the case of northern white pine mechanical pulp the pentosan losses during the early stages of delignification are high and these losses decrease with greater lignin removal until about 50 per cent of the lignin is removed.

Delignification of northern white pine with chlorine gas and 3 per cent alcoholic ethanolamine until a snow white material is obtained with practically no lignin also causes high pentosan losses. The pentosan losses for both aspen and northern white pine treated in this way compare with the values obtained by chlorine dioxide, if products are compared having the same lignin content. The length of time that the material is exposed to chlorine evidently greatly influences the pensosan losses. The large number of chlorinations used to get a pure white material probably account for the high pentosan losses.

It is apparently not possible to prepare a true holocellulose from northern white pine and, on the basis of the literature, probably not from most other coniferous woods by either the chlorine-ethanolamine method or the use of chlorine dioxide. A true holocellulose can be closely approached with aspen and, according to the literature, with other hardwoods.

In spite of the unavoidable pentosan losses in treating white pine with chlorine dioxide the procedure has merit in preparing a series of delignified pulps for comparison with commercial methods because the retention of polysaccharides is much greater and the yields are higher. The use of chlorine dioxide for preparing a series of partially delignified aspen or other hardwood mechanical pulps should give results easier to interpret than in the case of softwoods.

Abridgments of some of the papers presented at the annual meeting of the Superintendents Association held in Cincinnati, Ohio, June 18, 19 and 20, 1940, appeared in the July, August, and October issues. A final installment of these abridgments is published this month.

Research in Industry

EVERETT S. LEE, Engineer
General Engineering Laboratory
General Electric Company

On the program for your Convention in Washington last year, I find there was included an address on the subject, "Our Amazing Industry." Although I neither heard nor read that address, I can well visualize the enthusiasm of the speaker for that subject, and how you, yourselves, must have been inspired from the picture that was painted, for yours is truly an amazing industry. While the number of people in our country has been doubling in the past 50 years, your alert and progressive industry has increased the use of your product six fold, from where "paper" once meant the daily newspaper or the material the butcher wrapped the meat in, until today paper and its derivatives have been extended into many fields and are accepted without thought—like the air we breathe—adding immeasurably to our health, our comfort, and to our high standard of living. We in the electrical industry are proud to have had an opportunity to work in co-operation with you to electrically modernize your plants, to increase your production, and to make better grades and more varieties of paper at greatly lowered costs.

To have accomplished these results there must have been the urge from within to seek that which is new, to find a better way, to discover the yet hidden wonders of nature in the processes which you daily use and in new processes, all to the end that you make available new and improved products at lower cost. Research is the active response to this urge.

So much good has come from Research and there is so much of merit to tell of its usefulness that one is staggered to compress into a few words an adequate picture. The recent report of over 1,700 distinct research groups in this country, affording employment to some 50,000 workers, with an annual expenditure of from 150 to 200 million dollars, with an existence dating back some 40 years, makes us realize that we are not dealing with a transient program but rather with an established fact.

Fifteen million American men and women are at work today in jobs that did not exist in 1900. These jobs do exist today because, through Research, industry has been able to develop hundreds of new products. And it has been able to make them so inexpensive that millions of people have been able to buy them.

I want to bring to you a picture of one phase of Research which I find is little discussed though its presence is everywhere and its foundation is fundamental. I speak of Measurements.

Lord Kelvin has said "That when you can measure what you are speaking about and express it in numbers you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind, it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the stage of Science whatever the matter may be."

Lord Kelvin made that statement in May of 1883 in an address before the British Institution of Civil Engineers, London, England, and as I have had opportunity to bring to many people the thought he has expressed, they have universally agreed to its perfectness. Our ability to measure, therefore, becomes a measure of our advance in knowledge, of the effectiveness of our Research, of the extent of our application of the new knowledge uncovered by Research.

I well remember when the voltages of our electric power transmission lines were being extended upward until they had reached 220,000 volts. In some sections the ravages of lightning were most severe on transmission line operation causing outages with resulting discontent. It became imperative to learn the characteristics of lightning, its voltage, its time duration, its current magnitude. To measure these was an almost insurmountable problem as no one knew when or where the lightning was going to come and when it came it only remained for a few millionths of a second which did not allow much time for human beings to gather around to make the measurement. However, spurred on by the genius of Dr. Steinmetz, engineers found the means of voltage measurement in the figures produced on a photographic film by the lightning voltage using the researches of Dr. Lichtonberg in Germany in 1777 and of two Frenchmen, Trouvelet and Brown, in 1888.

But in addition to the voltage magnitude they needed to know the time duration—and here cathode-ray oscillographs were moved into the field, to obtain the signature of the lightning.

Sympathy for research on the part of those who direct is the fountain source of new achievement.

There have been many calls for gages of the non-contact type, particularly for coated materials. The capacitor principle is the only one we know for this application but our experience with open capacitor plates in the presence of humidity effects is that the capacitance will vary beyond tolerated limits. We have searched in vain for other suitable means though none has been found.

General Chemical Company's long experience in producing Salt Cake has resulted in a knowledge of the manufacturing controls necessary to the production of Salt Cake especially suited to needs of Paper-making. Salt Cake is but one of many products—Aluminum Sulfate (Commercial and *Iron Free*), is another—produced by General Chemical for this industry. Each offers particular advantages to paper manufacturers.

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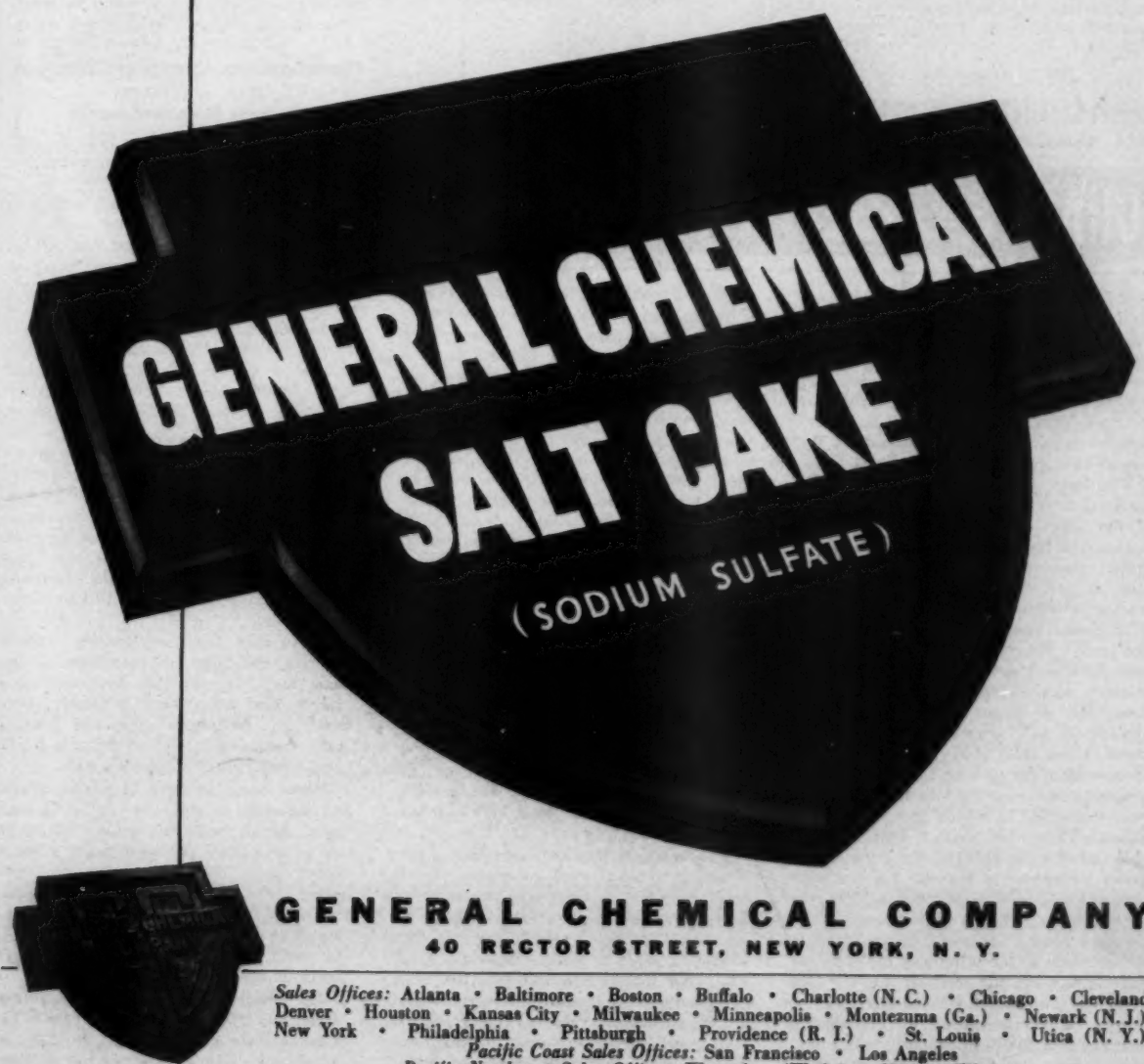

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CRANES *Northern* HOISTS

Could there be more extensive application of the contact type of gage, its superior characteristics could be realized, and as is so often the case, continued work in this field would give promise of bringing into existence the new ideas that are needed for the non-contact applications. It would appear, therefore, that application of the contact type gauge would be advantageous.

The heart of practically all industrial applications of electricity is the motor. One of the latest results of Research to this fundamental product is Formex wire, of greater durability than heretofore. Now there is not much romance in putting a coating of enamel on wire and for over thirty years enamel wire remained much the same. But recently chemical research brought forth a new material and electrical research, recognizing its potency as a wire insulation, developed new means for its application, and lo, an advance materializes anew in this field which had lain dormant of new ideas for so long. And to prove it a new measurement had to be devised—a heat shock test in which the old product blistered—the new product remained durable and firm. In addition to this the instruments developed to test the Formex wire present an imposing procession; here they are—the abrasion tester for measuring the durability of the film; the compression tester for determining the solidity of the film; the continuity tester for assuring that the film is perfect throughout without any holes or flaws; the reflection meter for determining that the film has been properly baked, and the scrape tester for measuring the stick-to-itiveness of the film to the wire.

Another problem of interest to you is that of drying, and the use of infra-red radiation has been suggested. Where infra-red has been used to advantage for baking, the amount of evaporation is small and the liquid to be evaporated is quite volatile, both of which contribute to low power consumption becomes high. Using present values, the relative cost of steam as compared with electricity for paper drying is about 1 to 5. The simple configuration of paper is also greatly in favor of the use of steam. Some new thought of heat generation or utilization will have to be found to satisfy this problem.

I close with a story from your own industry, that of the use of paper as an electric insulation in high-voltage electric power cables. It was not so many years ago that the highest voltage of these cables was 66,000 volts. The insulation consisted of paper wrapped tightly around the conductor, heated with a compound, the whole covered with lead. Though it was the best known at that time, no one was satisfied with the result. So Research was called to help.

Measurements became prominent in first obtaining a bench mark of quality. Small samples of the cable operated at room temperature at 44,000 volts lived for about 90 hours. It was suggested that life tests should be made at higher temperatures, say 85C., but shorter life was expected as is usual with most insulating materials. But with these samples, at the higher temperature, much longer life was obtained, several hundred hours, even a thousand hours, and even more. Cooling the sample to room temperature caused it to break down electrically, thus ending its life. This was a most unusual result.

But the reason was soon found for the treating compound, though of fairly high consistency at room temperature, liquefied at 40 deg. C., thus producing at the higher temperatures an oil-filled paper insulation which is the best electric insulation of its kind. This we had learned from capacitor insulation using your best capacitor paper, a product of most extensive Research. And thus our oil-filled cable was born.

So perfect was this insulation that it was predicted that the voltage could be doubled and the insulation would be better than ever. And so it was for the cable designed for 132,000 volts that was first made and installed never had an electric failure so perfect was the installation of your paper treated with the oil. Today there are over 400 miles of paper insulated oil-filled cable in this country in successful operation, operation so perfect that electrical failures are unknown. And just as we in the electrical industry have been proud of this outstanding contribution, so can you be proud of the part of your product in it.

Continuous Cutting Chipper

N. P. WARDWELL

Carthage Machine Company

All of us who have watched chippers are familiar with the many imperfections of their operations.

Troubles have been eliminated by the use of the principle of putting one knife in a stick before the previous one has left it.

The old necessity of keeping the spout full no longer exists. The cuts per minute are so high—up to 7200—compared to 1200 with old style—that there is ample capacity for normal purposes using only one stick at a time. When chipping single sticks, better contact can be had with the bed knife. There is no chance of jamming. No top logs have to tip down to get cut. Small sticks always reach the inside where the knives are closer together and where consequently continuous cutting can be had.

A long column of wood is no longer necessary to keep logs from bouncing back. The continuous cutting keeps stub ends from flying back, and even the shattering of these ends is minimized with knives that never let go.

When logs feed in steadily without bouncing the chips are practically all the same length. In the first installation of a 12-knife disc when the chip samples were sorted in a laboratory screen and later by hand, the results showed 95 per cent 1 inch chips which was the desired length.

In one case, 750 cords of poplar, balsam and jack pine is regularly cut before each knife change, and the sawdust has been cut to around 1 per cent from a much higher figure. In another place, on green wood, the operators took away a wheelbarrow full of sawdust every hour and a half instead of every hour, a reduction of one third. This improvement is a result partly at least, of the steady feed.

The steady feed is also partly at least responsible for longer knife life. The position of the knives through the disc also helps a lot. The logs cannot rub on them so much, so they run much cooler. All

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the information we have indicates two or three times the knife life.

The eight knife chipper which we started two years ago has run long enough to show something about upkeep costs. It shows that the wear on the disc is entirely at the chip opening edge. Because these discs are steel plate, this wear can be corrected by welding a bead or two along this edge and grinding it flat. We haven't definite proof yet that the spout will wear less but we are very confident that it will because the pounding of logs is stopped. It is made of steel now without a liner and when worn, can be built up with welding rod.

In the new chippers we have been rating capacity by cuts per minute, length of chip, and number of sticks per cord. Thus a 54-inch chipper 600 r. p. m., 7200 cuts per minute, ½ inch chip, 150 sticks to the short cord would cut 75 four-foot sticks a minute or 30 cords per hour. This is cutting at the rate of four-foot stick in 8/10 seconds. If you put a stop watch on it, you would find it was just about that.

Choice of speed is influenced by several considerations. With induction motors belt driven or direct connected we want flywheel effect enough to carry us through the largest stick without slowing down the motor more than 10 per cent. Speed is the least expensive way of getting that flywheel effect, and we design our discs so they can run safely 10,000 feet per minute peripheral speed. It is possible to get the same effect by putting more weight in the disc and pulley if slow speed is desired. Slow speed might be preferable if the required capacity is low because the knives would stay sharp a little longer and therefore, sawdust formation would be lower. On the other hand, high speed breaks up the chips better and gives more capacity and the knives still last remarkably well as compared to the old style. With synchronous motors direct connected, the slow speed is almost compulsory because of the terrific loads when a big stick goes through, using sometimes 1000 hp. or more for a short peak.

For power we figure about 5 hp. hours per cord for soft wood and about ¾ more for hard wood. So if you wanted 30 cords per hour we would recommend 150 hp. with a little more for safety. Then we put in enough flywheel so that the motor is working all the time between big sticks getting it back up to speed for the next big one. These figures may change when we get more definite test data. But they have proved to be safe.

Controlled Mixing and Blending of Coating Materials

E. M. RUPP, Ceramic Engineer
National Engineering Company

Manufacturers of coated papers have indicated considerable interest in equipment for improving the uniformity and smoothness of their coatings. This interest led us to conduct a series of tests in cooperation with the Edgar Brothers Laboratory on the results to be obtained by mulling the coatings in the Simpson Mixer which is widely used on all types of dry, plastic and slurry mixes.

The Simpson Mixer consists of a circular stationary pan in which is mounted a combination of plows and wide-faced, large diameter, heavy mullers. The plows and mullers revolve. The plows turn the materials over and line them up under the mullers which impart an intensive mulling, wiping or smearing action. The combined action of the plows and mullers results in a very rapid and thorough mixing and blending and a smearing out of unmixed particles in the batch. The result is a smooth paste in a very short time. After mixing, the materials are discharged by the action of the plows through an outlet or door in the bottom of the pan. Complete discharge may be accomplished in a few seconds or longer if desired.

The photograph No. 1 shows the 24 in. dia. pan Laboratory size Simpson Mixer in which the tests were made. The results obtained in the laboratory size Simpson Mixer are quite comparable to those obtained in the 9 sizes of production machines although the production machines usually are more efficient because of the wider, heavier mullers used.

Photo No. 2 shows the No. 2—6 ft. dia. pan Simpson Intensive Mixer having a capacity of approximately 100 gals. or more per batch.

The data which is presented is on the makedown of clays in the muller with subsequent tests for smoothness at the Edgar Brothers Company laboratory.

In one series of tests a paste was made in the muller and Edgar Brothers added the casein in a laboratory agitator type of mixer and tested for smoothness.

In a second series of tests the paste was first made in the muller, then the casein solution was added in the muller and the resultant coating tested for smoothness.

SERIES 1

Size of Batch—20 lb. Clays
Mixing time—2 min. dry, 18 min. wet; total, 20 min.
Per cent Solids—54.5%

Batch No.	*Satin*	*H. T.*
1.	.....	100%
2.	25%	75%
3.	50%	50%
4.	75%	25%
5.	100%	.....

Procedure:

The dry clays were added to the muller and mulled 2 minutes. Then all the water was added and the batch mixed an additional 18 minutes. Samples of each of the batches were sent to the laboratory for smoothness tests.

At the laboratory these paste samples were made into coating colors by adding

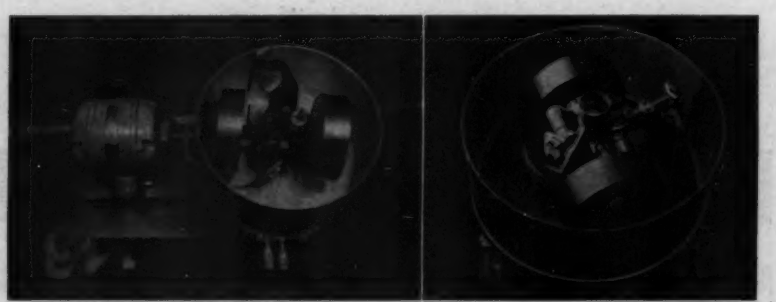

Fig. 1 (left)—24-in. laboratory size Simpson intensive mixer. Fig. 2 (right)—6-ft. diam. pan Simpson intensive mixer.

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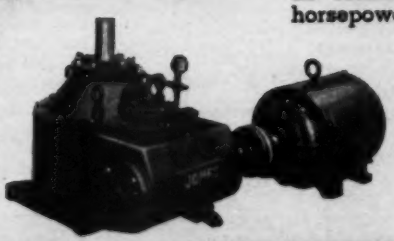
HERE is a line of machines that fills a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, etc. requiring a vertical shaft drive.

Many of these Jones units have established excellent performance records in a wide variety of service. As a result of that experience a complete standard line has been developed covering 15 standard ratios ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.

• This Jones Worm-Helical Speed Reducer on a lacquer agitator is typical of the wide range of services for which these drives can be used such as ore roasters, pulp tank mixers, furnaces, bending rolls and similar applications.



The new Jones Bulletin No. 75 covers complete details on these new Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.

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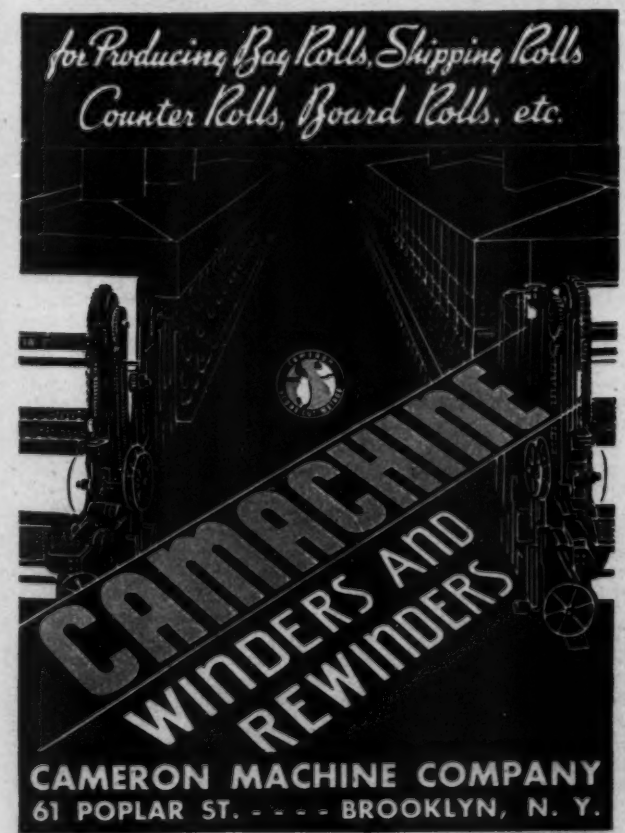

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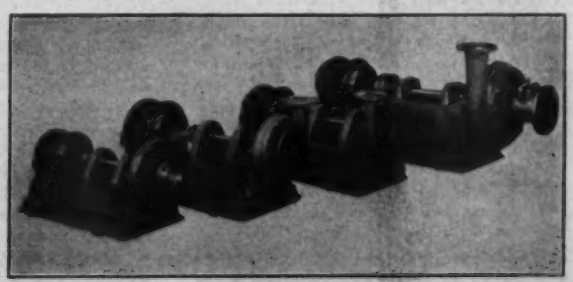

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cooked casein (12 per cent based on clay) and moderate stirring.

The resulting coating colors were compared with similar colors prepared by the usual old method in the laboratory.

For this comparison the test sheets were prepared on a small laboratory coating machine which coats directly from a roll of raw stock, by pulling out a long coated sheet approximately 15 feet in length and then cutting this into sheets of a size convenient for testing.

As an indication of the degree of makedown, smoothness tests were made on the 1st, 5th, 10th and 15th sheets of each set.

Additional tests were made to determine the effect of adding the casein to the paste in the muller. Two batches were made, the only variation being an adjustment of the mullers.

SERIES 2

Size of Batch:
20 lb. Clays

Mixing Time:
2 min. dry, 18 min. wet, 10 min. with casein
Total 30 minutes

Per cent Solids:
48.5% before casein added
38.7% after casein added

Batch: 75% *H. T.* 25% Satin

Casein Solution:
14% casein to Satin clay
13% casein to H. T. Clay
5.25 parts H_2O to 1 part dry casein
1 oz. concentrated ammonia to 1 lb. dry casein
Casein added slowly to water and stirred to prevent lump formation. Ammonia then added and mixture heated to 50° C., then cooled.

Procedure:
20 lbs. of dry clays added to muller and mulled 2 minutes. All water added and mulled an additional 18 minutes. All casein solution added and mulled an additional 10 minutes. Smoothness readings as similarly described were taken. There were two batches "A" and "B" the only difference being a muller adjustment.

Additional work is being done with the addition of the casein dry to the dry clays with subsequent addition of the proper amount of water to the batch.

There seems little question but that through the use of the Simpson Mixer it is possible to obtain:
Faster makedown,
Better dispersion,
Improved smoothness, and
Improved control

The following savings also should be available:
Less labor
Lower power costs
Less Floor Space
Power machines for given production therefore less investment and
Less maintenance

Acknowledgment is made to Edgar Brothers Laboratory for their co-operation in developing this paper.

Chipper Knives

C. P. ROBINSON
Special Representative
Heppenstall Company

Chipper knives were placed in service shortly after the erection of the first chemical pulp mills.

The first sulphite mill was built by C. D. Ekman at Bergvik, Sweden, in 1874. This mill had a capacity of 485 tons yearly. Mitscherlich erected a sulphite mill in Germany in 1880, where he produced a strong pulp by long cooking at low temperature and pressure.

On August 19, 1853, Charles Watt and Hugh Burgess received a patent in England covering the pulping and disintegrating of shavings of wood and other similar vegetable matter for making paper. Mr. Burgess, one of the patentees, was the manager of The American Wood Paper Company's works at Royersford, Pennsylvania, where five tons of soda pulp were made daily, and later this company built a new plant, producing the same grade, having a capacity of fifteen tons daily, which was located at Manayunk, Pennsylvania, and was leased to Jessup & Moore and Martin Nixon.

The wood was brought to the plant as cordwood of 5-foot lengths. The bark was stripped off by hand and the wood was cut into slices about one-half inch in thickness by a cutter or chopper, a machine looking like a feed-cutter on a large scale. Four steel knives, from 8 inches to 10 inches wide and from 12 inches to 15 inches long were fastened in a slightly inclined position to a solid cast-iron disk of about 5 feet to 7 feet in diameter, revolving at a high speed, chopping these thin slices of wood across the grain. The wood was fed to the machine through a trough 10 inches to 12 inches in width which was placed on sufficient angle to permit the wood to slide down towards the disk. A piston or pusher, which was propelled by a rack, pushed the wood steadily forward until it was entirely cut up. The piston then returned to its original position and the operation was repeated. About 40 cords of wood were cut daily in this plant.

In 1886, The Fletcher Paper Company, Alpena, Michigan, erected the first sulphite mill in this country. At the beginning, disks three-quarter inches thick were produced by gang saws and were packed into the digester without being chipped. The first chippers were installed in this plant between 1893 and 1895, and were two-knife affairs without a bed knife. On the Pacific Coast at about the same time, chippers were built with knives set in the face of a heavy pulley, which had the advantage of allowing the knives to clear the bed knife very exactly. These chippers, however, did not operate successfully because the centrifugal force held the chips inside the pulley rim, causing the chipper to pack and clog.

One of the first chippers of foreign design was installed at the Whalen Brothers' plant at Woodfibre, B. C., now operated by British Columbia Pulp & Paper Co., Ltd. When this plant started operations the wood was delivered to the mill in the form of cants 12 inches square by 60 feet long. The chips produced were about 2 inches long, the length of the feed.

In the manufacture of knives, first consideration must be given to proper selection of the steel that goes into them.

Modern heating and forging, heat treating and machining facilities are essential for proper fabrication of the steel into a first-class product.

Chipper knives composed of alloys which give high carbide, wear-resistant and strength qualities, properly fabricated, have given unusual performance, as they combine hardness with toughness, which are essential for successful chipper knife operation.

The care of chipper knives is very important. When not in use they should be stored in a dry place in such a manner that they are properly protected against rust, and the knife blades against being nicked.

In placing the knives on the chipper disk, care should be taken to see that the tightening of the bolts is gradual, and that too much strain is not placed on any particular bolt hole, as otherwise the knife may crack or break after it is put into operation.

The heads of the chipper knife bolts should be flush with the surface of the knife and should not protrude, otherwise sawdust and torn wood will result.

In cutting short chips the clearance angle between the stick and the chipper knife is important as the tendency for the knife to heat is increased. This is one reason for the development of a new chipper disk with slots running through the disk at about a 45 deg. angle, into which the knives are fastened. These slots afford protection for the knives to some extent.

The grinding procedure is also very important. Some of the trouble with chipper knife performance can be traced to burning on the grinder due to dirty emery wheels which have not been cleaned by an emery wheel dresser; and because the operator of the grinder has been careless in setting up the knives on the machine, resulting in irregular bevel.

A spray of water should be played on the emery wheel at all times where it contacts the knife blade. The bevel of the blade must be straight—not concave nor convex. The grinding should not be rushed. Grinding burrs should be removed with a hand oil stone. For best results knives should be honed in a circular motion until all the fine irregularities are completely removed from the cutting edge. The under side of the knives should also be honed to remove the burrs. An extremely light grade of oil should be used as a lubricant in connection with this operation.

The chipping edge should be watched for glossy, glazed or blue spots, as such spots indicate burning. Knives which have been burned in grinding cannot be reclaimed. A soft, fine-grain emery wheel should be used—hard wheels cause burning. Some plants, which do not permit the cutting edges of the knives to become badly worn, touch up the blades with a hand oil stone as the stone gives a more uniform smoothing to the cutting edges than is possible with the electric portable grinder or the hand file.

The portable grinder and the hand file touch up the knife blades quickly while on the chipper disk and, when expertly handled, do a good job. Improper grinding or filing weakens the cutting edges and

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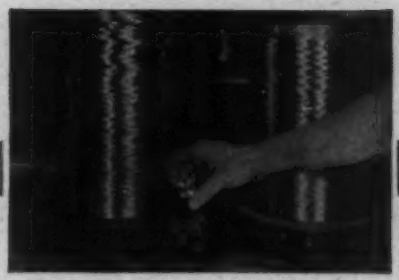

Very important is the accurate drawing of wire to diameter by this die.

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causes them to crumble. Very often the grinder or filer unintentionally decreases the cutting angle considerably beyond the original degree of the blade and it is necessary to strain-relieve and regrind these knives before they are in proper condition for chipping.

In general, a check on the sawdust content in the chips should be the best guide as to the frequency of grinding.

Sometimes the bevel of chipper knives causes some trouble. The degree and style of the bevel is subject of some controversy, as some mills prefer a double while others prefer a single bevel blade.

The mills using the double bevel blades claim better quality and more uniform chips and reduction in the quantity of sawdust and oversized chips because the double bevel does not crush the wood as much as the single bevel blades, and the chips are less likely to fly. They also claim reduction in horsepower and vibration and longer life for the knives.

The mills using single bevel knives claim they break up the chips much better and permit of better penetration in cooking. A bevel under 37 deg. weakens the chipping edge of the blade and is not recommended. A 45 deg. bevel is very strong but is objectionable to many mills for various reasons, principally because of the extra power required.

The edge of the chipper bed knife should be kept in proper condition as a dull knife will cause the sticks to bounce very badly and any movement of the stick, other than straight feed, is an indication that good wood is being destroyed.

Originally, laminated or plated knives were used and this type is still used in some mills. The principal objection to this type is the possibility of the weld breaking between the cutting steel and the soft backing, while the chipper is in operation, which has resulted in some serious accidents. Many mills prefer the solid knives which are given the proper temper on the cuttings side and then softened up in the back. When properly fabricated, the solid knives are more rugged and less likely to crack or break.

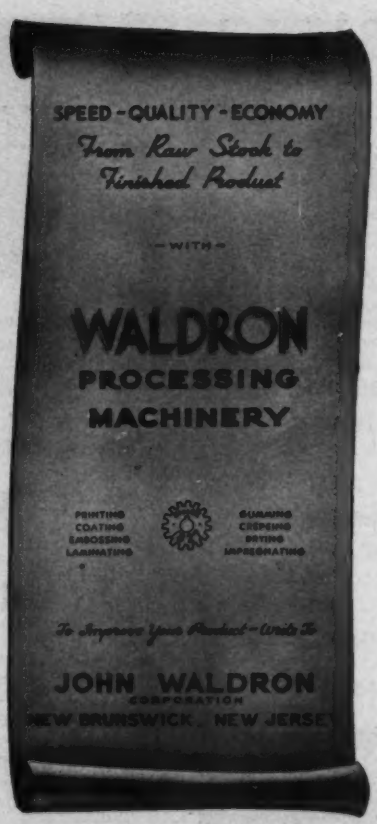
Knives which are drilled with round or oval countersunk bolt holes have been found to be the strongest and least likely to break. Oblong holes or slots which have square corners have a tendency to crack at the corners.

In order to determine the efficiency of chipper knives, proper records should be kept as to the life, length of service and the production between grids, time and estimated production loss in changing knives, number of regrinds per knife, and particular record should be made of any unusual circumstances that would tend to shorten the life of a particular knife or knives, such as damage from spikes, broken bolts, etc. Any economies which might be effected through change in bevel, etc., could also be recorded. As chip classification is so strongly related to chipper knife performance, this record should also show the kind and condition of the wood chipped, the quantity of good chips, as well as the quantity of bruised oversized chips and the sawdust waste.

Gradual improvements have been made in chipping machines which have necessitated improvements in the style and performance of chipper knives. The general demand is for greater production of cleaner and more uniform chips at lower operating costs. The chipping of various types of hardwoods, and the chipping of "Cat-face" pine in the South have increased the work of chipper knives. In order to meet these increased demands special alloy steel chipper knives of varied treatments and analyses have been developed.

Under most favorable conditions these special knives have given over ten times the service between grinds than the plain carbon knives. In the majority of cases they are giving four to six times the service as compared with the plain carbon knives, and it is not necessary to grind away as much of the steel in bringing the knife blade back to a keen cutting edge, thereby increasing the life of the knife by adding to the number of grinds.

Many mills which have previously had definite fixed cycles for operating chipper knives have been able to increase the cycle several times between regrinds, resulting in increased production with decreased overhead costs.



Recent Developments in the Printing of Fine Papers

RONALD L. DRAKE
Champion Paper & Fibre Co.

The past five years have witnessed so many startling developments in the printing industry that this informal talk can at best touch upon only a few of the high spots which have had the greatest influence upon fine papers.

These changes have been most marked in the field of letterpress printing but the other branches of the printing art—offset, lithography and gravure—have also felt the quickening pulse of technical research and development.

Much has been written in the trade publications of the graphic arts relative to the awakening of the letter press industry to the need for revision and improvement of the then existing processes.

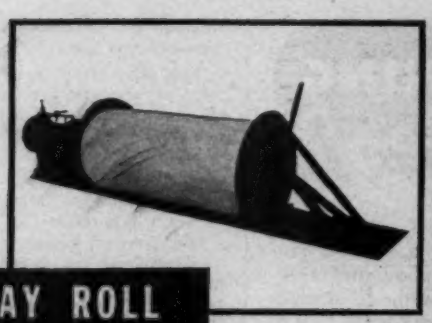
Probably the most important of these developments is covered by the term "Heat-Set" inks, known under the trade names of Vaporin Inks and Flash Dry Inks. These inks were not new—they had been known to the ink makers for some years. Certain large printing plants had been playing with the idea for some time prior to this period but it took a new and vigorous publishing concern, in company with a large printer who was willing to try new things, to really put them over. As a result of their pioneering many of the large nationally known magazines are printed almost wholly by this method.

With the introduction of heat-set inks the whole tempo of the letterpress industry accelerated until today there are presses capable of printing four colors on each side of a web of paper at speeds of 800 feet per minute. And higher speeds are being mentioned every day.

The climax of this whole picture is that this performance is being made on coated papers, a thing considered impossible ten years ago.

Briefly, the process consists in printing with an ink having a relatively high percentage of volatile constituents combined with a resinous type base. The printed web of paper is passed through an oven heated by gas to a temperature reported in excess of 2000 deg. Fahr. Actually the gas flame in these ovens plays upon the printed surface of the web of paper and ignites and burns off the volatile constituents of the ink, baking the remainder into a thoroughly dried hard film. As a result, subsequent printing or handling can be done without smearing or rubbing or in any manner disturbing the printed effect so as to detract from its appearance. Smut sheets or tympans of any nature are no longer necessary. And the finished product has a snap and brilliance never equalled by the old methods.

While one group of technicians have been working day and night to perfect the heat-set type of inks and the equipment necessary to use them, another group of equally determined scientists and practical men have been slaving to produce the exactly opposite type of inks. It was only a few months ago that one of the large printing ink companies announced to a slightly bewildered printing trade the successful development of cold-set inks. These inks are applied from heated fountains by means of heated rollers to hot plates. When printed on the "cold" paper they solidify or dry. Several presses have been equipped for handling these inks and the industry is awaiting with much interest the first commercial production from these presses and these inks. There is insufficient information available at the present time as to whether this new method will present any serious paper problems. It is quite evident, however, that it will be less severe in its reac-



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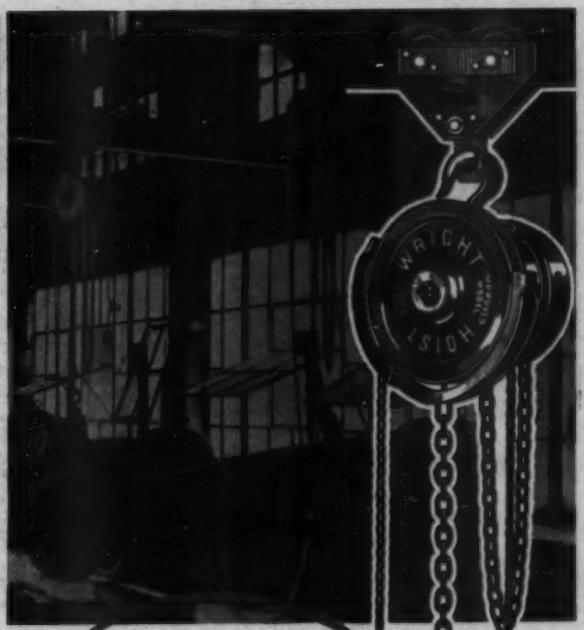

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tions on the paper than the heat-set type of inks.

For many years "offsetting" onto the back of the next printed sheet was the bugbear of the letterpress printer.

In the early 30s, a new method of spraying freshly printed matter for the prevention of offset was introduced. This consisted in spraying a fluid mixture of various materials through an air-brush onto the surface of the sheet. Probably the most common spray in use today is flour and water. This type of spraying equipment is relatively inexpensive, as is the spray material, and it was not long before such equipment was found in nearly every shop down to the smallest job printer.

The introduction of this spray equipment had a very definite effect upon the paper industry insofar as the regular grades were concerned but it had an even greater effect when it was followed very shortly thereafter with the introduction of gloss inks. These are inks which dry with a high shine, thereby eliminating the necessity for press or spirit varnishing. They were warmly welcomed by the printing trade as they presented a very real saving. It can hardly be said that they were as warmly welcomed by the paper industry. However, papers have been developed which meet the severe requirements of these inks and there is every indication that gloss inks will become the stock-in-trade of practically all printers.

While the letterpress printer has been having his fun, the offset printer has not been idle.

One of the most important developments in offset printing which was a direct result of this period was the improvement —it might almost be said the introduction —of high fidelity four-color process printing. This placed the offset lithographer directly in competition with the letterpress printer. And when the paper mills supplied him with a coated two side enamel which would perform satisfactorily, the offset printer stepped into the direct advertising field. Identical pieces produced by the two processes are so similar that it is exceedingly difficult to tell which has been produced by letterpress and which by offset.

The lithographer has taken up gloss inks too. While the results are not of the same order of finish as those secured by the letterpress printer, through their use much brilliance and snap has been added to offset work.

One of the most fascinating of the very recent developments lies outside the field of fine papers—but it is worthy of comment here. It is the production of modern newspapers by the offset process. All of which stresses the importance of keeping closely in touch with the offset field. It is a rapidly growing, vital force in the field of printing and new developments will be forthcoming constantly.

Gravure printing, or rotogravure printing as it is more commonly called today, is not a babe in arms among the three methods and it has grown tremendously in the last ten years. From the former class of newspaper supplements only, gravure has broken into all the fields of fine printing. Catalogues and magazines are now produced by this method. And, furthermore, four-color process work of marvelous coloring and brilliance is becoming more common every day.

This same period has seen the development of one new process, known to the trade as the Inta-print process. It is actually a combination of the three methods of printing and probably the first true combination ever developed. It is basically gravure in that an intaglio plate is used, but it is lithographic in character in that a thin sheet of copper is clamped around a cylinder just as a sheet of zinc or aluminum is clamped on an offset press. It is letterpress in type inasmuch as the screen values are varied in area, as in a halftone plate, instead of being restricted to variation in depth only as in the grue gravue cylinder.

There seems to be no restriction upon the type of papers which can be printed by this method. The effects secured in both monotone and color are beautiful, having a depth and tone value seldom equalled.

This process is the result of the combined efforts of a press manufacturer and a well-known printer. It was released so short a time ago that it is too soon to chart its probable progress but it should go far. Just what effect it will have upon the manufacture of fine papers is of course unknown, but it should be watched carefully.

There has been no endeavor in this brief paper to call attention to or to report on all the developments of the printing and allied trades but rather to high-spot those developments which are most before us as the manufacturers of fine papers.

The Use of Stainless Alloys in the Manufacture of Sulphite Pulp

G. C. KIEFER, Research Laboratory Allegheny Ludlum Steel Corporation

The stainless alloys comprise a group of about forty different types of varying chromium and nickel contents with or without the addition of other elements, such as molybdenum, columbium, titanium, etc. The three types of alloys most commonly used in the sulphite paper industry are as follows:

Type	Carbon	Chromium	Nickel	Molybdenum
308	.08 Max.	19-22	10-12	
317	.10 Max.	18-20	12-14	3-4
329	.10 Max.	25-30	3- 5	1-1.5

The type 308 alloy was developed particularly for sulphite pulp equipment because it had been found that by increasing the chromium content to 20 per cent, a very marked increase in resistance to corrosion was obtained.

The following accelerated corrosion test shows the difference in corrosion rates between regular 18-8 and type 308 to hot sulphite liquor.

	4 per cent sulphurous acid containing 1 per cent bisulphite at 365 deg. Fahr.
Regular 18-8	.60 mgs./sq. in. surface/hr.
Type 308	.20 mgs./sq. in. surface/hr.

This pronounced increase in corrosion resistance of type 308 is also emphasized in tests conducted at the Virginia Polytechnic Institute. L. E. Ward determined the corrosion resistance of various metals in fatty acids recovered from kraft pulp waste

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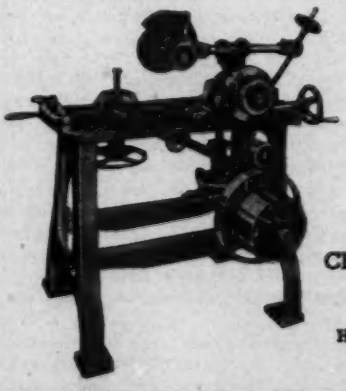

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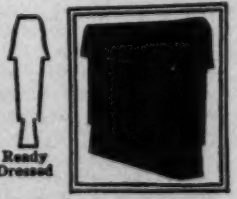

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liquors. He found that the regular 18-8 alloy showed a corrosion rate of .061 inches penetration per year, while the type 308 alloy showed only .0010 inches penetration per year. This information is contained in Bulletin No. 30 of the Virginia Polytechnic Institute by Ward and Vilbrandt.

Besides this marked increase in corrosion resistance, the high alloy content of type 308 materially retards the precipitation of harmful carbides which occur when the chromium-nickel alloys are welded and thus lessens the susceptibility of the alloy to intergranular attack. Experience has shown that by controlling the composition within the range of the alloy content available in type 308, material up to one-half inch can be welded without precipitating harmful carbides. As most of the sulphite equipment excepting digesters and other pressure vessels, are fabricated largely from materials under one-half inch, type 308 can be used in the majority of cases where welding is involved.

For thickness greater than one-half inch where the material is fabricated by welding and not subsequently annealed or where the repair or modification of this heavy equipment by welding might occur, the columbium or titanium modification of the alloy is suggested. The columbium or titanium modification should also be used where low temperatures (800-1600 deg. Fahr.) stress relieving is involved. Where the titanium modification is used and welds cross each other or where single welded equipment is to be stress relieved at low temperatures (800-1600 deg. Fahr.) a columbium bearing welding rod must be used as very little titanium remains in the deposited weld metal. For this reason the columbium modification is usually preferred.

We are not suggesting, however, that the type 308 alloy should be used for all equipment in the pulp making industry. The selection of any alloy should be governed by the corrosive conditions encountered. Generally speaking, types 308 and 329 offer the highest resistance to corrosion where the liquid phase is encountered, or in the gaseous phase at temperatures above the dew point. The type 317 alloy is more resistant to service conditions where condensation occurs, or where the sulphuric acid content of the sulphite liquor is abnormally high. The type 317 alloy is also satisfactory for hypochlorite bleaching solutions and in pulp washing equipment following chlorine bleaches.

There are five experimental digesters fabricated from type 308 in operation. They have been in service from one to eight years and up to the present time are entirely satisfactory. There are also large amounts of the same alloy in the form of cast valves, seamless tubing and rods being used in hot and cold acid lines and heat exchangers. This alloy has also given excellent service for collector rings, screens and similar digester accessories.

The use of this alloy in blow pits has been largely confined to perforated bottoms and targets. Some mills are using considerable amounts of these alloys for liners for pulp washing troughs. The type 329 alloy is also used for the same purposes, but not in as large quantities as the type 308 alloy.

The type 317 or molybdenum alloy can be used in most every place in sulphite equipment where the types 308 and 329 are used. Because of its higher price, however, greater economy can be obtained by limiting its use to those parts where corrosive conditions demand an alloy with particular corrosion resisting characteristics.

For example, type 317 is far more resistant to sulphuric acid solutions than either the type 308 or type 329. The limiting concentration of sulphuric acid for types 308 or 329 is approximately .25 of 1 per cent.

Type 317 is also less susceptible to pitting when exposed to chlorine containing solutions. It is being used satisfactorily for pulp washing equipment following chlorine bleaches where small amounts of hydrochloric acid generally develop in the wash water. Laboratory and service tests also indicate that it is resistant to calcium hypochlorite in either the alkaline, neutral or acid conditions. We would point out, however, that none of the stainless alloys mentioned are resistant to moist chlorine gas and are not suggested for any parts that are in direct contact with it.

There are several difficult corrosion problems in the pulp industry which require careful consideration in order to control if not entirely overcome. In tubular heat exchangers certain conditions result in the formation of a deposit on the walls of the tubes. Analysis of a deposit from sulphite mill heat exchanger tubes indicates that this deposit consists mostly of sodium sulphate and organic matter. The conditions causing this deposit to form are not fully understood as in some cases only the tubes in one or two exchangers of a large number using the same raw acid will be affected.

It is essential that this deposit be periodically removed in order to prevent the formation of pits in the tube wall. The corrosion resistance of stainless steel is dependent on the maintenance of a protective film. The formation of deposits on the walls of the tubes, in this case, prevents the formation of this protective film and localized corrosion occurs.

In removing this deposit by mechanical means, care should be exercised in preventing the tool from gouging or scratching the surface as deep scratches form pockets in which deposits accumulate and subsequent cleaning is made more difficult. While on the subject of cleaning methods we might mention that the use of an acid solution for removing scale deposits has been suggested. Where stainless steel is involved the use of nitric acid is indicated as this acid will not attack stainless steel and has an additional advantage in that it has a passivating effect on the surface. However, in most equipment other metals such as iron, copper, and bronze are used with stainless steel in the same system and as nitric acid rapidly attacks these metals its use must be confined only to the stainless parts of the equipment.

Another problem frequently encountered is the corrosion of metal tie rods, bolts and screws when inserted in wood which is exposed to moist sulphurous atmospheres. The wood soon becomes saturated with acid and that part of the metal in contact with it is rapidly corroded. The most satisfactory solution to this problem is to paint that part of the metal in contact with the wood with a good asphalt paint.

Something should be said about the use of stainless steel in pulp screens. The failures of these screens have been due either to the thin gauge of the plate, the design, or the method of fabrication.

Failures which we have investigated have resulted from cracks that are produced by alternating stresses or in other words fatigue cracks. These cracks appear to be associated with the slots in the supporting bar and the spot welds holding the screens sections together. In connection with the supporting bars, it will be necessary to eliminate slots or thicken up the cross section. The cracks in the area of the spot welds that hold the sections together appear to result from the fact that this area of contact between the two sections is too small to take care of the stress encountered. A change in design which would permit line welding instead of spot welding and so help distribute the stress more uniformly might eliminate such failures. If it were possible to anneal the formed sections before joining them so as to remove strains introduced during forming, this would also help to decrease the tendency toward the formation of fatigue cracks.

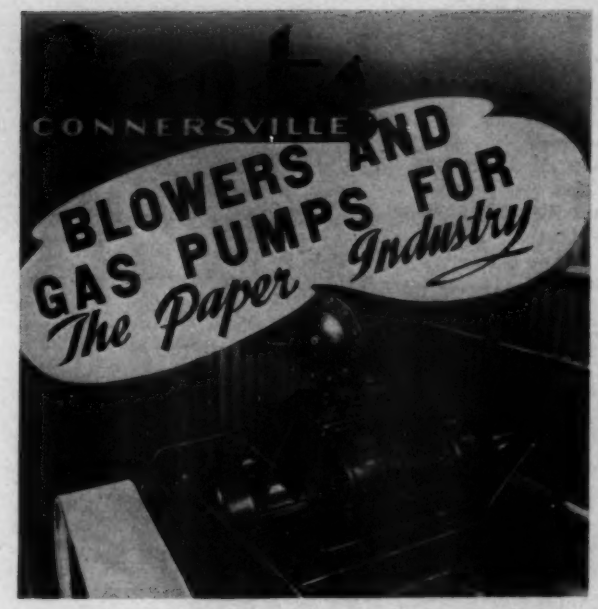
In the application of any metals or alloys to certain service conditions a knowledge of their characteristics and properties is always desirable. The following brief suggestions are offered for the purpose of assisting those who fabricate or repair stainless steel parts in their own plant.

A clean surface is necessary to obtain the maximum corrosion resistance of stainless steel. Chalk marks, grease, scale and other surface contaminations should be removed whenever it is possible to do so.

Operations such as machining and bending that result in the cold working of certain areas of metal and leave these cold worked regions in contact with relatively strain free areas, should be followed by annealing in order to insure best corrosion resistance. This is not necessary in all conditions of service.

In the case of types 308 and 317 heating into the range of temperatures from 800 deg. Fahr. to 1600 deg. Fahr. results in the precipitation of harmful carbides in the metal and renders it susceptible to intergranular corrosion under some conditions of service.

The recent development of a new melting process "PLURAMELT" by which various compositions can be intermelted so that we may take advantage of the corrosion resistance of any one alloy in combination with the highly desirable physical properties of ordinary steels, leads us to hope that the use of the straight chromium-iron alloys will be extended. This process will also afford the opportunity to lower the cost of equipment. In applications where high pressures are involved such as in digesters, etc., the use of stainless alloys has been prohibitive largely on account of the cost and because the austentic alloys which have been used are characterized by very low elastic properties and as a result it is necessary to use very heavy sections. By this new process it will be possible to produce a metal which will have 80-90 per cent of its cross section of a relatively low cost, high-tensile common steel in combination with 10-20 per cent of a chromium alloy,



Gas Pump illustrated has capacity of 4000 CFM; 3.75 lbs. pressure; and is handling CO_2 gas for chemical treatment purposes in midwestern paper mill. Unit shown is operating twelve to twenty hours per day. "R-C" Blowers and Gas Pumps are built in a wide range of sizes from 10 to 50,000 CFM and for pressures up to 15 lbs.

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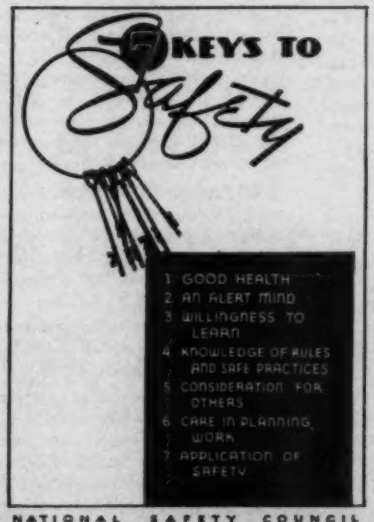

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say 28 per cent chromium, or any other stainless alloy which may be selected.

The straight chromium alloys have suitable corrosion resistance and much higher elastic properties than the austentic alloys. It is indicated that by the use of this PLURAMELT process the strong ductile backing of ordinary steel, to a large extent, eliminates the brittleness of these ferritic alloys.

This is the second installment of papers presented at the fall meeting of the Technical Association of the Pulp and Paper Industry in Seattle, Washington, August 20-23. The first installment appeared in the September issue. More of these abridgments will be published in a later issue.

Chipper Knives

NELS G. JOHNSON
Assistant General Sales Manager
Simonds Worden White Co.

Chipper knives, generally speaking are of three classes—laid carbon steel, solid carbon, and solid alloy, the latter being the high production type which has come in for considerable consideration in recent months.

When laid or solid carbon steel knives leave the factory, they are of maximum hardness for the particular mill intended. Of course, we all know that conditions in most mills vary—where a 60 Rockwell (C hardness) chipper knife will work satisfactorily one place, it's too hard for use in another mill. Fundamentally, however, overheating of chipper knives, regardless of original hardness, is detrimental to edge retention.

Some mills use water as a cooler while chipping. This method of keeping knives cool is good if the water supply is generous and is directed so as to keep the entire knife cool as it cuts. If the water supply is insufficient, its contact with knives already heated can easily cause knives to crack, ultimately break out or check.

There are many contributing factors in this battle of steel against heat, such as: (1) dull knives, (2) dull anvil knives or throat plates, (3) improper setting of anvil knives against disk, (4) blunt bevels, (5) lack of secondary bevels, (6) disk speed.

A recent development in the chipper field particularly in the east and south is the multiple knife chipper, using 8, 10, or 12 knives. The added knives make for faster cutting. Being mounted through the disk face so that only the cutting edges come in contact with the wood, the knives do not become hot enough to draw the temper.

Softer or greener woods can be cut to good advantage with sharp bevels while shorter bevels are necessary on dry, hard, or frozen woods.

Secondary bevels are also the subject of much difference in opinion. Theoretically, the second bevel should make it possible to use a greater or keener cutting edge bevel by lending generous support to the knife where needed. It should also provide chip clearance, making it possible to get the chips away faster, all of which makes for better chips and less sawdust.

The steel in the high production type of knife is of a dense structure. For this reason, overheating leaves little room for grain expansion as a consequence small checks are produced. The temper of these knives is not affected by temperatures from 450 to 650 deg. Fahrenheit, consequently, while in use, these knives remain sharp much longer, but being of a more dense structure, they are not, generally speaking, as tough; they are affected more by sudden temperature changes.

Some mills that have run the high production knife from 12 to 40 or more hours before removing for grinding have found it more profitable to change knives every eight hours and regrind them, regardless of condition. This makes it possible to regrind quickly, remove but little stock and cut more uniform chips with less sawdust.

Since overheating seems to be the arch enemy of all chipper knife performance, it naturally follows that it should be kept at a minimum in grinding. A wheel should be selected which is on the soft side and this is particularly true of wheels for grinding the high production knives.

Wheels should be of aluminum oxide or refined aluminum oxide abrasive materials of grain size 36 to 60. Recommended bonds are vitrified, resinoid and silicate of soda.

In addition to care in the selection of the wheel, it is also important to use a cooler, such as water, or a neutral grinding solution, in such quantities and directed at the proper contact spot between the wheel and the work to keep the knife bevel cool. (Neutral coolers are recommended because highly alkaline solutions attack certain grinding wheel bonds such as resinoid.) Insufficient cooler supply is really worse than none at all.

An Experience in Vocational Instruction

O. T. DEFIEUX[1]

In 1933, the executives of the Camas Mill of Crown Zellerbach Corporation outlined a program of vocational training relative to the paper industry. It was thought that an opportunity should be made available for such employees who wished to extend their knowledge of the industry to do so, and that this could better be accomplished under an organized training program.

It was planned to provide a one-year training course, the opportunity for registration being unrestricted. An administrative board was established; one of the mill executives was appointed Dean and a series of 18 lectures were programmed. These lectures covered a general outline of the entire mill operations, from wood structure and preparation, through the various pulping processes, paper machine operation, paper converting, the final subjects being "Mill Organization" and "Management and Problems."

The executives, superintendents and foremen offered their services as instructors, and thus the Paper School was started. A total of 185 students registered that first year and those completing the course were insistent that they have an opportunity for advanced work. In addition, there was a large demand on the part of other employees to begin the course. Therefore, it was decided to continue the school each winter adding additional courses as the demand arose. At the end of the first four years a full four-year course had become an accomplished fact.

The extension to a four-year course has allowed the administration to revise the curriculum therefore to considerable advantage.

In 1939, a well-illustrated and handsomely-bound text book was compiled comprising 39 chapters with a total of 519 pages of printed material. Each of these chapters deals with some special phase of the pulp and paper industry and was written by an executive, supervisor or member of the technical department of the Camas Mill. These text books are loaned to the students during the period of their training without charge. A first edition of 600 copies has been printed and an additional 500 copies are now on the press.

The present schedule offers an interesting example of how a simple one-year course has developed into one of the most complete programs of optional education under corporation training activities.

At the end of each school year a graduation banquet is held and First, Second, and Third, and final Fourth Year diplomas are presented to those students who have made the necessary grades in their respective classes. Prizes are presented to the two highest honor students in each class, the prize for the two Fourth Year students being a week's trip to the Pacific Northwest paper mills at the company's expense.

A complete card index covering attendance, grades, etc., is maintained on all students who register for the Paper School, this information being available for the mill manager, personnel department and supervisors.

In evaluating the results after seven years of experience, we ask primarily what has it done for the student.

Many of the graduates have received promotion, some of which could be directly contributed to this opportunity for vocational training. Others undoubtedly would have received promotion irrespective of this training. It has provided a common meeting ground between student employees and the mill executives and supervisors which otherwise would not exist. It has been an incentive to supervisors to learn how to more ably express the knowledge they have accumulated through years of education and practical experience.

What the future of vocational training will be it is difficult to say, but it is our hope that it will always be carried out under democratic principles with equality of opportunity and freedom for private initiative.

(1) Steam engineer and plant superintendent, Camas mill, Crown Zellerbach Corp.

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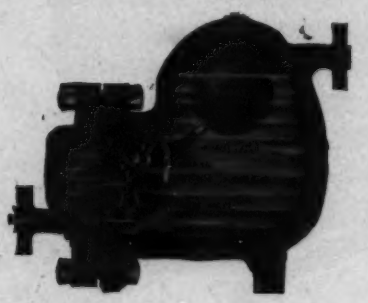
NEW EQUIPMENT AND SUPPLIES

Weight Operated Trap

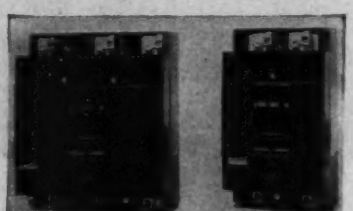
W. H. Nicholson & Company, Wilkes-Barre, Pennsylvania, has announced the development of a weight operated trap for steam or air service and for pressures from 500 to 1500 lb. (1000 deg. maximum total temperature). Designated as *Model C*, the trap is furnished in one body size only, with either ½, ¾ or 1 in. flanged inlet and outlet connections. Construction de-



tails include electric furnace cast steel body and cover; Stellited valve and seat; stainless steel float, latches, brackets and levers; spiral ply stainless steel-asbestos ring gaskets; heat treated alloy steel stud bolts, threaded full length; and intermittent action, and water sealed discharge valve. In operation, water entering trap raises float to high point of travel, where it releases weight latch, allowing counterweight to fall. The counterweight is attached to a crank which lifts the discharge valve wide open. The discharge valve is held wide open by the link latch until the discharging water carries float to low point of travel. At this point, the weight latch again engages counterweight, which has been lifted y falling float, and the link latch disengages, permitting discharge valve to close.

Breakers with Adjustable Trip Setting

A new line of type AB general utility circuit breakers for enclosure, panel-board or switchboard mounting has been announced by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. These breakers, rated 50, 70, 90 and 100 amperes at 250 and 600 volts a-c.



2 and 3 pole, and 125, 250 volts d-c., are especially adaptable to lighting and feeder circuits, and motor branch circuit protection.

All breakers use the 100 ampere frame, permitting physical interchangeability. An adjustable magnetic trip permits close setting of the breaker for any tripping current from 3½ to 11 times the breaker's normal rated current, and enables the trip to be set in the field under actual service conditions to give maximum protection to the equipment. An inverse time thermal trip of the bimetallic type provides adequate protection for light overloads, such as motor starting currents.

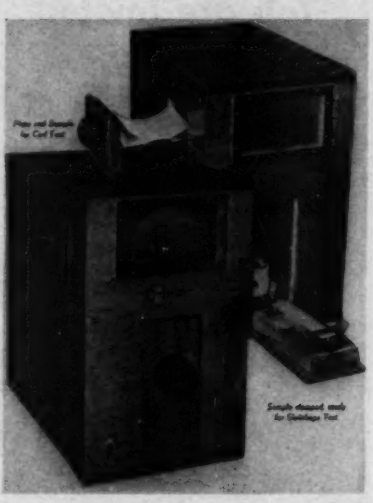
Terminals and base have been arranged for either enclosure, panel-board or switchboard mounting, thus one unit may be used interchangeably for any one of these conditions. Special breakers are available with shunt and/or undervoltage trips, and if required, auxiliary switches can be supplied to open or close separate circuits.

Curl and Shrinkage Tester

W. & L. E. Gurley, Troy, N. Y., has announced a testing device for measuring the curl and the shrinkage of paper. Known as the Gurley-Witham Curl and Shrinkage Tester, the instrument consists of an insulated mahogany cabinet, containing electric heating coils and thermostat for maintaining a temperature of 120 deg. Fahr. within it. Light is projected from a point source (a 32-cp. headlight bulb) through a collimating lens. A transformer provides 6-volt current for the bulb.

Both curl and shrinkage are read on the same scale, which is illuminated.

To measure curl, a 4-in. sample is placed upon heated metal plate and pushed into the path of the parallel rays of light. If the sample curls, its shadow is cast upon a translucent screen, ruled and numbered, where it is read. The test requires only about 30 seconds, and may be made at the paper machine or in the laboratory.

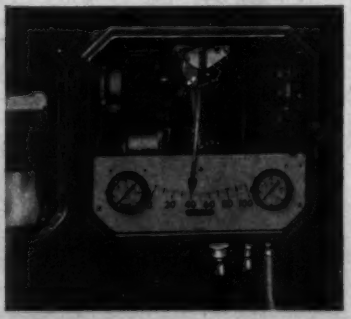


To measure shrinkage, a sample strip, used to support a clamp resting on a lever arm, is dryed. A pointer extends from the other end of the lever arm, the shadow of which is cast upon the translucent screen used in the curl test. After the paper is clamped and the door closed, the sample is adjusted for height by turning a knob, thus lowering sample and clamp so that pointer on scale is set at zero. As the paper strip shortens in drying, the pointer moves across the scale which is divided to 0.1 per cent for a total of 4 per cent shrinkage.

Both curl and shrinkage tests may be carried on simultaneously.

Remote Pneumatic Transmission System

Taylor Instrument Companies, Rochester, N. Y., has announced a system which utilizes standard Taylor instruments, for correlating



temperature, pressure, flow or liquid level data on a centralized panel or in a control room. The system, known as the *Taylor Remote Pneumatic Transmission System*, may consist of one or two transmitters

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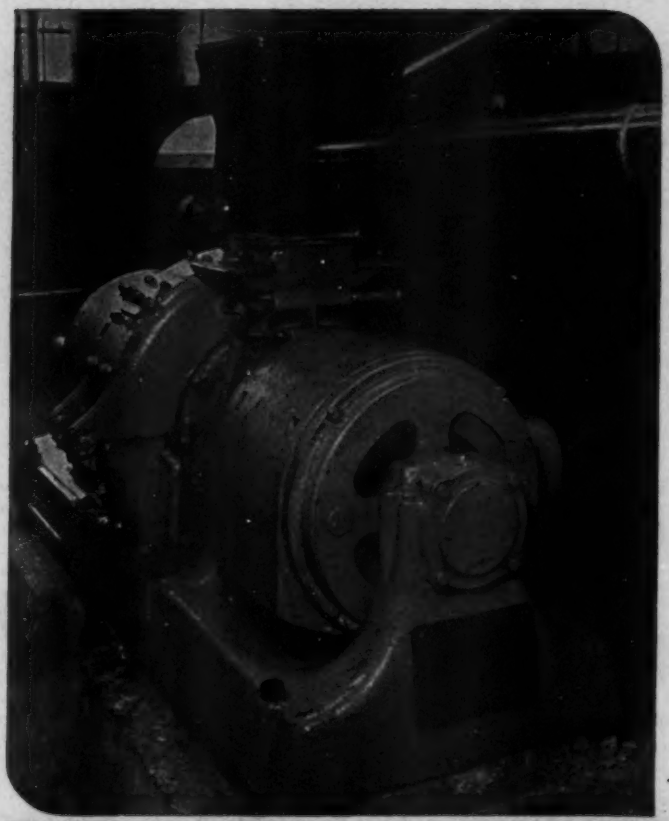

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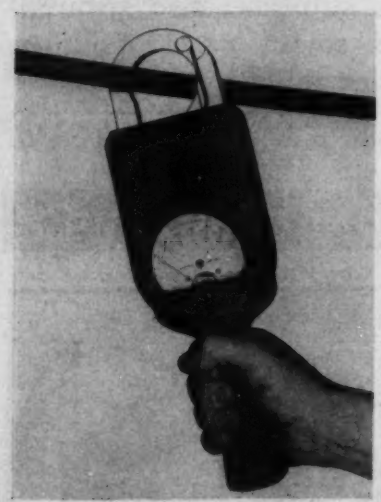
connected to a receiver; or one or more receiving instruments, not necessarily near each other, and as far as 1,000 feet from the transmitter. Transmitters or receivers may be indicating, recording or controlling types. Air pressure is the transmitting medium, with ¼ in. OD copper tubing as the means of connection.

When properly installed, the system, according to the manufacturer, is accurate to within ± 1 per cent of the scale range. The speed of response of the receiver to changes in output air pressure from the transmitter is largely dependent upon distance—the maximum lag being one second per hundred feet of connecting tubing.

Hook-On Volt-Ammeter

A portable instrument, the *Type AK-1* hook-on volt-ammeter for measuring alternating current and voltage on conductors of two-inch maximum diameter, has been introduced by the General Electric Company, Schenectady, N. Y. The instrument weighs only 3½ lb., and is designed for easy, one-hand operation. Four current



ranges, 0-15/60/150/600 amperes, and two voltage ranges, 0-150/600 volts, are available at the setting of a convenient six-position snap switch. The accuracy of the instrument is within three per cent.

Transformer, indicating instrument, internal resistors for extending the range, and selector switch are mounted in a single Textolite case. The handle, molded as part of the case, provides insulation and maximum safety for the operator.

Non-Magnetic, Abrasion-Resisting Steel

Joseph T. Ryerson & Son, Inc., Chicago, has announced a non-magnetic, abrasion-resisting steel which can be welded as being carried in stock. The steel, designated as *Manganal*, contains 11 to 13½ per cent manganese and 3½ per cent nickel. The nickel content permits Manganol plates to be welded without subsequent quenching treatment. Thicknesses up to ½ in. can be sheared. Manganol can be flame cut, and requires no subsequent heat treatment when formed or punched hot.

Plates (48 in. by 120 in.) are stocked in

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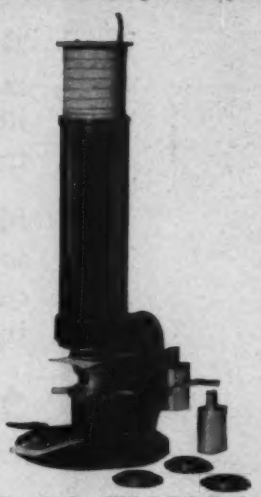

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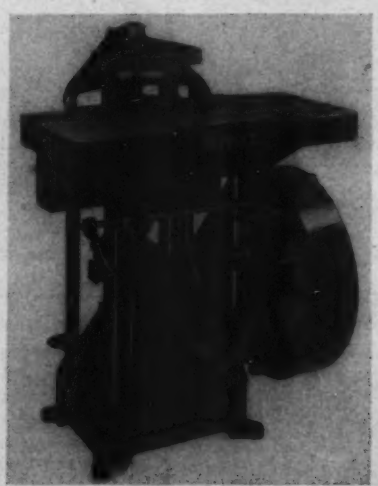
Typical applications, cited by Ryerson, include: journal boxes, pedestal liners, wear plates, mill liners, conveyors, and crusher hammers.

Napkin Scalloping Cutter

A napkin scalloping cutter, designated as model *5SA*, has been announced by Harris-Seybold-Potter Co., Dayton, Ohio. The ma-

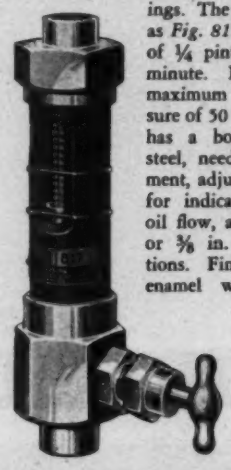


chine is designed to scallop the edges of 10-in. square cocktail napkins, quarter folded to 5-in. square. After scalloping, the napkins measure 9½ in. square. Standard knives cut scallops of about ¼-in. radius but other types of scallop may be had upon specification.

A pile of 50 to 60 napkins is cut at each stroke, a clamp which clamps only the edges of the pile holding the pile during cuttings. Napkins are loaded onto a moving gauge which is moved forward under the clamp, being positioned by stop screws. After cutting, the pile is withdrawn with the gauge. Two-hand throw-in is provided as a safety feature.

Pressure Sight Feed Oiler

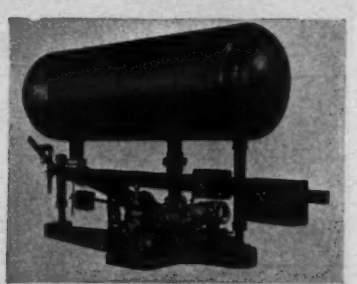
S. F. Bowser & Company, Inc., Fort Wayne, Ind., has announced a pressure sight-feed oiler which has been designed for lubricating elevated or out-of-the-way bearings. The oiler, designated as *Fig. 817*, has a capacity of ¼ pint to 1 quart per minute. Designed for a maximum working pressure of 50 pounds, the oiler has a body of wrought steel, needle valve adjustment, adjustable snap rings for indicating amount of oil flow, and either ¼ in. or ⅜ in. tapped connections. Finish is in black enamel with polished,



nickel plated trimmings. The unit is suggested by the manufacturer for application to calender stacks and dryers of paper machines and to other industrial equipment with points of lubrication so located as to make it difficult for operator to see if bearings are being lubricated.

Boiler Feeding and Deaerating Unit

An automatic unit for steam drainage and boiler feeding has been announced by the W. M. Acker Organization, Inc., 3167 Fulton Road, Cleveland. Designated as



the new *Acker Equalizer*, the unit is adaptable to pressures up to 250 lb. It can be used with or without individual traps, or with needle type valves. Condensate and make-up water according to the manufacturer, can be handled at temperatures of 212 deg. and higher. All water fed through the unit is deaerated.

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TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

Heat Stability of Sulphate and Sulphite Pulp

A comparative study was made of the so-called heat stability of sulphate and sulphite pulps. An investigation included the influence of the initial physical and chemical properties of the pulps, and of the effects of various conditions of heating on pulp strengths. After pulp sheets were heated (as the best conditions found by a series of tests) for 24 hours, at 120 deg., there is marked decrease in folding endurance, stretch, and tear resistance. Tear length and bursting strength apparently increased. In all cases sulphate pulps were much more resistant to heat treatment than were sulphite pulps. In the case of the former, losses in folding endurance were 90.3 to 95.6%, while in the latter, losses were often well over 99%. Heat stability seems to be largely independent of *p*H of the pulp extract, or of the titratable acidity of the pulp.

The initial strength tests also give no indication of pulp durability. A major factor appears to be pulp hygroscopicity. Sulphate pulps dry more slowly and also take up moisture more quickly and completely than do sulphite pulps. Heat (within certain limits) plays a minor role, and durability is definitely associated with the drying process. This was shown to be true irrespective of whether water was removed from the pulp by heat alone, by evacuating, or by drying over dehydrating agents; but it applies only to pulps that have been so dried that when subsequently reconditioned in moist air, they regain their approximate folding endurance.

The dehydrating process is then still reversible. At higher temperatures this is no longer the case. The critical temperature appears to be about 120 deg. C. and after drying at higher temperatures, folding endurance, stretch, and through-tear drop very sharply even after attempts have been made to recondition the sheet at constant humidity. Trials in treating sulphite pulp by simple purely mechanical means, so as to make it more resistant to heat were not successful. Fiber fractionation proved without effect, since the various pulp fractions showed little difference from each other as far as heat durability was concerned. Washing out the fine stuff had no material effect. When mixtures of sulphate and sulphite pulp were made up, they did not follow any law depending on the durability based on the % of each component. Such mixtures were characterized rather by the properties of the less durable component. When sulphite pulp was ground in alkaline solution, at room temperature, or at 80 deg. in the endeavor to neutralize acidity and to increase resistance, no tangible results were obtained. This was also true when sulphite pulp was steeped under pressure with aqueous NaOH. When pressure cooking of sulphite pulp with alkali was resorted to however the quality of sulphate were approached. Reports of practical experiments for improving sulphite are reserved for another paper. W. Brecht and R. Michaelis. Papier-Fabr. 38, 173-86 (1940).

Absorptive Capacity of Cellulose Wool

Crêped pulp or cellulose wool was shown to have a remarkable capacity for absorbing fluid exudates from wounds. The authors have described a device (Figure 1) for measuring the weight of water absorbed by cell wool under carefully standardized conditions. A series of discs are cut out of the layers of cell wool by means of a standard die. These are superimposed and compressed to form a cylinder weighing 10

grams, which is inserted into the device which carries a 100 gram weight capable of exercising a pressure (on the cell wool cylinder) of 14 grams per square cm. The instrument is then placed successively into 3 aluminum dishes containing 100cc of water (each), and the weight of water absorbed at 20 deg. in 5, 30, and 180 seconds is recorded, the precise conditions for the test being carefully described. Bleached but unsterilized wools are very absorptive. Usually sterilization lowers the absorption markedly except in the case of so-called sterilization-proof cell wools. Paul Praetorius and Armin Hillmer. Papier-Fabr. 38, 163-8 (1940).

Paper for Telegraphic Tape

A satisfactory tape was obtained from a mixture of equal parts of bleached sulphite pulp and unbleached sulphite. The former contained 86-8% alpha, and 6% pentosans, while the latter contained 7% pentosans. The mixture was beaten to 65 deg. (S.R.?) and then treated with a mixture of 20% starch, 15% water glass, and 1% animal glue. Following this impregnation, the pulp was further treated with 5-12% papermakers alum. Tests are described. I. G. Kulev and N. L. Timesheva. Tsentral. Nauch-Isseldovatel Inst. Bumazh. Prom. materially. (1940) No 29-30, 230-47 through C. A. 34, 8279 (1940).

Impregnation of Liquor Prior to Sulphite Cooking

Small scale experiments are recorded in which spruce wood with varying degrees of moisture was digested by the sulphite process both with and without pretreatment with steam and with vacuum treatment. Preliminary steaming followed by evacuation gave the best results. Air was thus most completely removed from the wood and most complete liquor impregnation followed. After the digestion, the pulp obtained had the least percentage of uncooked splinters and yields were increased. However strength qualities remained practically unchanged, irrespective of whether the wood had or had not been pretreated. These findings were substantiated by large scale experiments. Long evacuation periods were more satisfactory than short ones, and dry wood gave better results than that with high moisture content. Erik Hägglund, T. Bergek, Gunnar Carlsson, and Bertil Wadman. Papier-Fabr. 38, 197-203 (1940).

Degradation of Halogenated Spruce Lignin

By using mild oxidative degradation methods on lignin it was possible to obtain varying amounts of vanillin, as reported in previous papers. Substituted lignins were now subjected to similar methods, with the object of establishing the point of introduction of substituents into the lignin molecule. When a bromolignin, formed with bromine and hydrobromic acid, was subjected to alkaline oxidation with cobaltic hydroxide, the principal degradation product, obtained in about 8% yield, was 6-bromovanillin. Besides a small amount of unsubstituted vanillin was formed. Etherification or blocking of free phenolic groups is required for substitution in position 6, and this is considered evidence that units in lignin are united to each other by etherification at position 4. An objection that substitution in position 5 is excluded by the presence of furan or pyran systems does not seem to be valid. Only a part of the lignin could possibly exist in this form. Furthermore, when methyl-lignin is subjected to treatment with mercuric acetate, an acetyl mercuric grouping is introduced into the molecule and this can be replaced by iodine on treatment with potassium iodide. The resulting ido-lignin, has the iodine in the aromatic nucleus, and on alkaline oxidative degradation with cobaltic hydroxide, and oxygen, yields 10% of 5-iodovanillin. Mercuration must therefore have occurred, partially at least, at position 5. Willy Lautsch and Gertrud Piazolo. Ber. 73B, 317-20 (1940) through C. A. 34, 6064 (1940).

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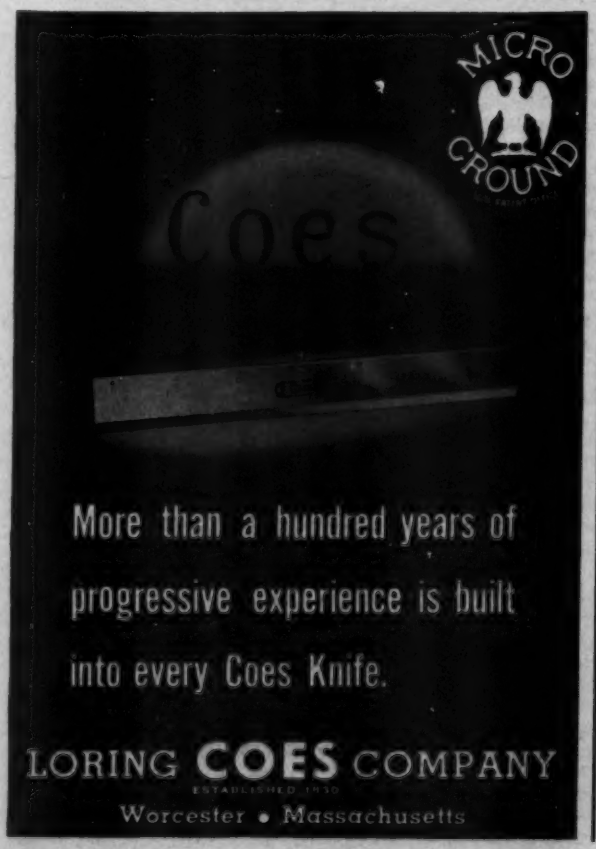

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The new Stickle Automatic Tension and Thermal Control (illustrated above) stabilizes steam flow to paper machine, controls moisture within very close limits, eliminates cockle and drier snap-offs, reduces curling and shrinkage. Very little manual attention is necessary.

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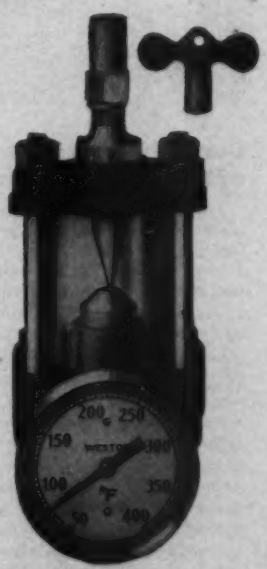

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IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Process and Apparatus for Coating Paper

Patent No. 2,214,772. Gerald D. Muggleton, Wisconsin Rapids, Wis., assignor to Consolidated Water Power & Paper Company, Wisconsin Rapids, Wis., a corporation of Wisconsin. Application November 18, 1937, Serial No. 175,182. 8 Claims. (Cl. 92—40). A process of coating a newly formed web as the same is carried forwardly on an endlessly moving paper forming wire which comprises, depositing coating material upon the upper surface of said web, applying a coating material to the lower surface of the wire upon which the web is carried whereby a portion of said coating material is deposited upon the lower surface of the web, washing said wire to remove the remaining portion of the coating material, retrieving said washing liquid and coating material, and using the same as the charging stock for said first mentioned coating operation.

Process of Making Fiberboard

Patent No. 2,215,353. Joseph W. Gill, Elmhurst, Ill., assignor to United States Gypsum Company, Chicago, Ill., a corporation of Illinois. Application March 29, 1937, Serial No. 133,649. 4 Claims. (Cl. 92—7). The process of making a molded straw board, comprising shredding the straw to about an average of one inch in depth, then digesting said shredded straw without chemicals under about 15 lbs. per sq. in. steam pressure for about two hours without completely softening said straw, then double refining the digested straw in attrition type mills at consistencies of 10% and 4-5% respectively, then forming the refined straw into board, and drying said board.

Coated Paper and Method of Making the Same

Patent No. 2,214,565. William J. Montgomery and Donald B. Bradner, Hamilton, Ohio, assignors to The Champion Paper and Fibre Company, Hamilton, Ohio, a corporation of Ohio. Application January 26, 1938, Serial No. 187,075. 6 Claims. (Cl. 91—68). In the making of coated paper the process which comprises applying to the paper stock a layer of paper coating composition comprising an aqueous suspension of mineral filler and adhesive, drying said layer to produce a water absorptive layer of coating material, applying to the surface of said absorptive layer a second layer of coating composition comprising mineral filler and adhesive in aqueous suspension, thereafter contacting said second layer of coating composition with a finishing surface having a finish substantially the same as that desired on the coated paper and drying said second layer with its surface in contact with said finishing surface until the coating is no longer adherent to the finishing surface.

Paper Manufacture

Patent No. 2,215,328. Melvin L. Kemp, Blandford, Mass. Application March 2, 1938, Serial No. 193,524. 5 Claims. (Cl. 92—39). The method of manufacturing paper which consists in, moving a web of paper being formed on a making element past a suction device to remove fibers along a longitudinal portion of the web, mixing said removed fibers with coloring matter, returning the mixed fibers and coloring material to the element where the fibers are removed, and finally in deckling said longitudinal portion of the web by directing a stream of water thereonto, the said coloring material being of a color different from that of the fibers removed.

Paper Making

Patent No. 2,215,335. Thomas H. Parkhill, West Springfield, and Lawrence W. Shattuck, Woronoco, Mass., assignors to Strathmore Paper Company, West Springfield, Mass., a corporation of Massachusetts. Application January 11, 1938, Serial No. 184,416. 2 Claims. (Cl. 92—40). The method of producing paper having a colored deckle-edge which consists in, moving a web of wet paper-making material of a certain color longitudinally on a paper-making element, removing some of the fibers of the paper making material from the web along its longitudinal side edges to provide deckle-edge portions which are of less thickness than the rest of the web and have irregular marginal edges, then applying liquid coloring material of a different color than said paper-making material to said deckle-edge portions only of the web while the same is still moving and wet, and substantially simultaneously with the latter step subjecting said deckle-edge portions to suction to draw said coloring material therethrough.

Coated Paper and Method of Making the Same

Patent No. 2,214,564. William J. Montgomery and Donald B. Bradner, Hamilton, Ohio, assignors to The Champion Paper and Fibre Company, Hamilton, Ohio, a corporation of Ohio. Application January 26, 1938, Serial No. 187,074. 9 Claims. (Cl. 91—68). Printing paper carrying a cast surface coating which comprises a major portion of adhesive and a minor portion of filler.

Papermaking Machine

Patent No. 2,216,817. Herman L. Kutter, Hamilton, Ohio, assignor to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio. Application May 2, 1938, Serial No. 205,444. 4 Claims. (Cl. 92—43). In a papermaking machine, a flow passage for supplying stock to a forming wire, a series of spaced vertical plates extending across said passage with the plates extending parallel to the stock flow and in a zone just ahead of the position of engagement of the stock with the forming wire, a common connecting means at one side of said series rigidly attached to only one side edge of each of said plates, the projecting portions of the plates being unsupported and the terminal edges of the plates remote from said connecting means being located just within the limits of the body of stock flowing past said plates and the upstream edges of said plates extending at a small angle to the direction of stock flow towards the plates to prevent fiber lodgment, resilient filler pieces between the outer sides of the plates at the ends of said series and the adjacent portions of said flow passage and substantially co-extensive with the end plates of the series, means supporting said connecting means for movement transversely of the direction of stock flow past said plates, and means for reciprocating said plates transversely of the direction of stock flow past said plates.

Paper Widening Machine

Patent No. 2,217,306. Harold Griswold Burrill, Baltimore, Md., assignor to Elk Paper Manufacturing Company, Childs, Md. Application April 25, 1938, Serial No. 204,253. 3 Claims. (Cl. 154—42). In a machine of the class described, the combination of a plurality of paper supply rolls supporting a plurality of webs of paper, means for feeding said webs of paper, a plurality of table means for supporting the webs of paper as they travel, said table means being in spaced relation, a plurality of grinding wheels each in juxtaposition to one of said table means, said grinding wheels having substantial width with the axes thereof angularly disposed in a horizontal plane and tilted in a vertical plane with respect to the longitudinal edge portions of each of the traveling webs whereby substantial portions of the grinding surfaces are in contact with the longitudinal edge portions of the traveling webs to feather said edges, means for rotating the grinding wheels, means for applying adhesive to at least one of said feathered edges, and means for pressing the said edge portions together.

Process of Digesting Wood or Other Ligno-Cellulose Materials

Patent No. 2,192,239. George Victor Palmrose, Longview, Wash., assignor to Weyerhaeuser Timber Company, Tacoma, Wash., a corporation of Washington. Application December 7, 1937, Serial No. 178,467. 4 Claims. (Cl. 92—11). The improvement in the acid sulphite process for recovering cellulose from ligno-cellulosic materials which comprises submerging a portion only of the material in a concentrated solution of a bisulphite from the class consisting of alkali metal bisulphites and magnesium bisulphite, the ratio of the weight of the liquor, including bisulphite solution and water contained in the material, to the dry weight of the material being approximately between 2 to 1 and 3 to 1, the bisulphite liquor containing from about 5.7% to 2.85% of combined sulphur dioxide and sufficient free sulphur dioxide to complete the cook, and continuously wetting the surface of the overlying portion of the material with the liquor.

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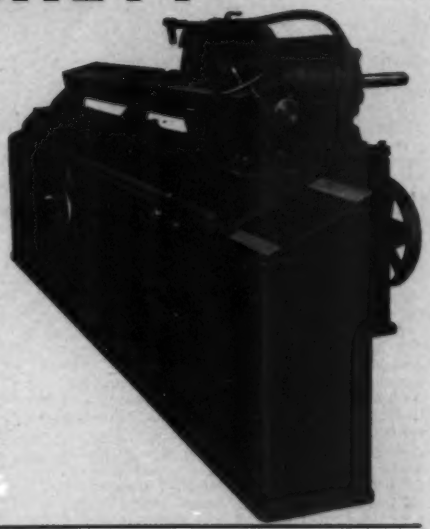

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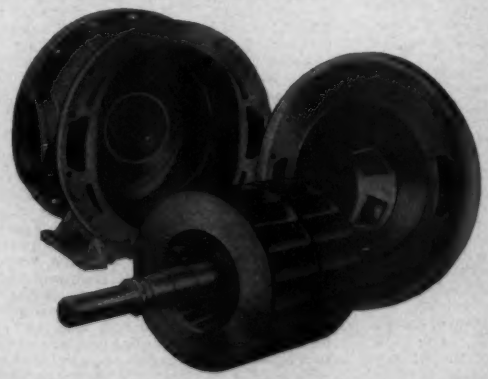

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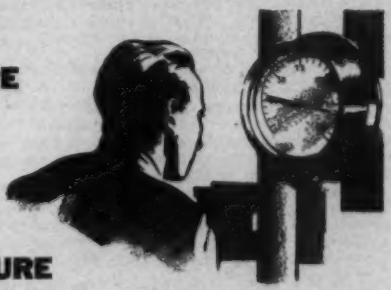
STEAM PRESSURE vs. ROLL TEMPERATURE



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New Catalogues and Publications

Brown Instrument Co., Philadelphia—Two new catalogues have been published recently. Catalogue No. 6706 has to do with the company's thermometers and pressure gauges and covers the complete line of vapor-actuated, gas-actuated, mercury-actuated and portable thermometers for indicating, recording and controlling processing operations. The other release (No. 2007) presents descriptions of the Brown line of electric flow meters for the measurement and control of steam, air, oil, water, chemicals and other fluids. Both catalogues are well illustrated and both contain much written information and data relative to the products.

C-O Two Fire Equipment Co., Newark, N. J.—An interesting booklet (C-24) entitled "In Case of Fire," has been released lately. The 8-page publication is well illustrated and contains descriptions of the uses of carbon dioxide for extinguishing fires. The release shows the company's complete line of hand and wheeled type extinguishers, hose systems, recharging equipment, sales and service points.

Cameron Machine Co., Brooklyn, N. Y.—A folder recently published by this company describes "Camachine 19" winder for paper and board mill service. Complete specifications are given and there are several illustrations showing features of the machine.

Carrier Corp., Syracuse, N. Y.—The part which air conditioning is playing in speeding up national defense production is outlined in a very handsome 20-page booklet just released for publication by this company. The booklet cites 26 industrial "case histories" where absolute control of air is essential to production and is divided into five short chapters dealing with non-hygroscopic products, hygroscopic substances, chemical reactions in materials, human efficiency, health and production, and biological or bacteriological reactions. Anyone connected with industry will find this booklet interesting and instructive reading.

De Walt Products Corporations, Lancaster, Pa.—An informative bulletin on this company's woodworking machinery contains many illustrations and data on the construction, usages and adaptations of various models of this company's saws. The bulletin cites features of the various models and contains sketches and photographs, in addition to specification tables. Those interested will find much information in this release.

Flexrock Co., Philadelphia, Pa.—The fourth edition of the Flexrock "Hand Book of Building Maintenance" has been published lately. This 70-page release contains a number of practical solutions to building maintenance problems and is filled with informative data as to the repair of floors, walls, roof, etc. There is included in this book considerable data relative to the company's resurfacing materials, waterproofing materials, and other products, as well as technical information regarding maintenance. Every industrial library should have a copy of this release.

General Electric Co., Schenectady, N. Y.—A new bulletin (GEA-3020A) contains data relative to this company's electrostatic voltmeter, a portable electrostatic instrument designed for a-c. and d-c. measurements of voltage on systems where one line is grounded. Complete specifications are given. Another G-E bulletin (GEA-2753) has to do with instruments and time switches. Both of these bulletins are punched for loose-leaf filing.

Harbison-Walker Refractories Co., Pittsburgh, Pa.—Three new publications have been released by this company. One bulletin, a 15-page release, gives data and characteristics of high-temperature bonding mortars. A second release deals with the company's "Duro" acid-proof brick and tile, illustrates the various shapes of the bricks and tile, and presents brief written material as to characteristics and features. The third bulletin is a small folder on "H-W Coleman" fire brick for furnace linings.

Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago—Recent advances in the methods of fabricating and welding stainless clad steel are to be found in a new booklet just issued by this company. This attractive release, 16 pages in length, contains interesting facts and illustrations relative to welding and fabricating procedures including phases of forming, welding, heat treating, cleaning, grinding and polishing of stainless clad steel. Featured is a chart showing the corrosion resistance of the two types of "Ingaclad" to a long list of acids, alkalies and various corrosive liquids and materials in common usage.

Industrial Truck Statistical Ass'n., Chicago—A very informative and valuable publication entitled "Material-Handling Handbook" has been published by this organization. The 56-page handbook contains a wealth of data and numerous illustrations, all of which have to do with materials handling problems. Principles for materials handling are brought out in a clear, understandable manner by the use of well-written literature and graphic material. This handbook, available without cost to production executives and production engineers, is divided into four sections: 1) The Place of Material Handling in Industrial Management, 2) Material Handling Management, 3) Organizing an Industrial Truck Handling System, and 4) Practical Truck Engineering. Included in this release are tables of traction units, mechanical electrical equivalents, energy calculations and cost estimating data. This handbook is a real practical guide for the analysis of materials handling problems and operations and should be a part of every mill library.

International Nickel Co., Inc., New York City—Two new bulletins have come to the attention of this magazine's editorial staff. One bulletin (T-17) is a technical bulletin on the fabrication of Monel, nickel and Inconel seamless pipe and tubing. This is one of International Nickel's technical information series and contains considerable informative data relative to the title. The other release, described as a semi-technical publication, is an illustrated booklet containing comprehensive information on pumps and pump parts. Part of the book is devoted to a review of case histories. Performance data are given and much attention is given to the choice of suitable materials for pumps handling a variety of corrosives in a wide range of industries.

Lawrence Machine and Pump Corp., Lawrence, Mass.—Standard dredging pumps and hydraulic dredge machinery is the subject of a new bulletin (208-2) recently issued by this firm. Statistical data and illustrations are included in this new release.

Leeds & Northrup Co., Philadelphia—Described in an attractive 32-page catalogue recently issued by this company are "Micromax" temperature instruments for electric power equipment. This catalogue has been prepared for those concerned with the operation of generators, synchronous condensers, frequency changers, large motors, transformers and cables. There is much of interest in this release concerning the company's recorders.

Fred K. Schaub Engineering Co., Chicago—The complete line of this company's Magnetrol liquid level controls are described in a new publication just issued. The catalogue (640-M) contains extensive data and numerous illustrations regarding the construction, features and adaptations of the products. Cross-sectional diagrams show operating features and specification tables are included.

Signode Steel Strapping Co., Chicago—The November issue of *The Signode Seal* contains many interesting facts about shipping problems and the use of this company's steel strapping. This 22-page publication contains many illustrations and informative written material regarding packaging and shipping.

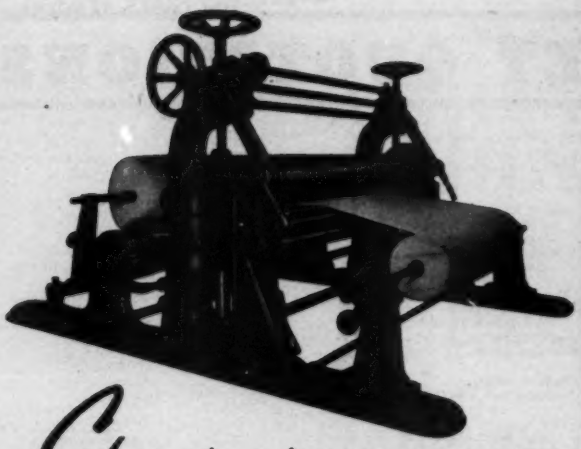
Swenson Evaporator Co., Harvey, Ill.—Two new bulletins (F-100 and F-101) describing this company's rotary drum vacuum filter and top feed filter, have been published recently. Both are illustrated and both contain much of interest regarding these two products. Both bulletins are punched for loose-leaf filing.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.—Several new and interesting bulletins have been released by this company. A fine booklet concerning capacitor application on industrial circuits is one of the several issued. This booklet (Application Data 49-060) is 20 pages in length and has stiff covers. It contains theory, formulae, tables and charts and tells how, where and how much capacity to apply to circuits for power factor improvement. A complete table of contents makes reference easy in this booklet. Another release (Descriptive Data 26-100) gives valuable facts about welders and their operation. Covered in this release are motor and engine driven welders and bare welding generators. Still another important publication is the new 64-page September (1940) edition of the popular "Quick Selector" catalogue which, by its information and data, simplifies selection of the correct electrical equipment for any motor, lighting or feeder circuit. Four pages of general application data contain NEC recommended installation practices.

BOOKS

Handbook for Chemical Patents—Edward Thomas, the author, summarizes in this volume the law as presented in an earlier book by himself, and also presents, in more detail, new phases of patent law. The book, totaling nearly 300 pages, is divided into 23 chapters. Among the chapter headings are the following: You can't keep a chemical secret; Patents raise problems; The nature of a patent; Suggestions for writing the specification; Inventions under the patent statute; Suggestions for writing the claims of a patent; Interpreting the specification; The patent application in the Patent Office; Amending the patent after it issues; Double patenting and division of application; Interferences; Assignments and licenses and employees; Patent suits; Patent evidence; and Foreign patents. There also are several chapters which discuss anticipation of a process, of a composition of matter, of a manufacture, of a chemical apparatus, and by prior publications. Three chapters are devoted to a discussion of infringement. The book is priced at $4.00 a copy by its publisher, Chemical Publishing Co., Inc., 148 Lafayette St., New York, N. Y.

Modern Foremanship and Supervision under New Deal Legislation—This book analyzes common practices prohibited or regulated by the National Labor Relations Act. It defines unfair labor practices; discusses the essentials of foremanship and supervision; and presents important rules and regulations which have a definite bearing upon cases coming before the National Labor Relations Board. Unfair labor practices under the Wage and Hour Law are explained, as are unfair practices under the Walsh-Healey Act. The volume is the work of Harvey B. Rector and W. A. Rinckhoff; the page size is 4½ in. by 7 in.; the cover, red simulated leather, gold embossed. Published by Law Research Service, 712-714 Keith Building, Cincinnati, Ohio, the book is priced at $4.50 a copy.



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Corduroy	2.25 to	2.50
Cottons—		
Washables, No. 1	1.75 to	1.90
Fancy Percales	3.50 to	3.75
New Soft Blacks	3.25 to	3.50
New Light Seconds	1.60 to	1.75
New Dark Seconds	1.40 to	1.50
Khaki Cuttings—		
Mixed	2.50 to	2.75
O. D.	3.00 to	3.25
New White Canvas	7.00 to	7.50
New Mixed Blacks	2.25 to	2.50
Shirt Cuttings		
New White No. 1	6.75 to	7.00
Silesias No. 1	4.25 to	4.50
New Unbleached	6.50 to	6.75
Fancy	1.85 to	2.00

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OLD RAGS

	per cwt.	
Roofing—		
No. 1	1.10 to	1.15
No. 2	.95 to	1.00
No. 3	.85 to	.90
Twos and Blues—		
Repacked	1.60 to	1.75
Thirds and Blues—		
Repacked	1.40 to	1.50
Miscellaneous	1.10 to	1.20
White, No. 1—		
Repacked	3.00 to	3.25
Miscellaneous	2.50 to	2.75
White, No. 2—		
Repacked	2.50 to	2.75
Miscellaneous	2.00 to	2.25

RAGS (Foreign)
ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)
ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shapperies	

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	per cwt.	
Gunny No. 1—		
Foreign	2.35 to	2.50
Domestic	2.35 to	2.50
Wool Tares—		
Light	2.25 to	2.35
Heavy	2.40 to	2.50
No. 1 Scrap Bagging	2.15 to	2.25
Manila Rope—		
Foreign	4.75 to	5.00
Domestic	4.75 to	5.00
New Burlap Cuttings	3.25 to	3.50
Jute Threads—		
Foreign	3.50 to	3.75
Domestic	3.00 to	3.25
Strings—		
Sisal	2.25 to	2.50
Soft jute	3.00 to	3.25
Mixed	1.10 to	1.25

WASTE PAPER
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	per cwt.	
Shavings—		
White Envp. Cuttings	3.15 to	3.35
Ord. Hard White No. 1	2.40 to	2.60
Ord. Soft White No. 1	2.15 to	2.35
Soft White, Extra	2.60 to	2.85
Flat Stock—		
Stitchless	.90 to	.95
Oversize Mags	.75 to	.80
Solid Flat Book	.65 to	.70
Crumpled No. 1	.50 to	.55
Solid Ledger Books	2.00 to	2.10
Ledger Stock—		
White	1.65 to	1.75
Colored	1.15 to	1.25
New B. B. Chips	.35 to	.40
Manilas—		
New Env. Cuts	2.60 to	2.75
New Cuttings	1.85 to	2.00
Sulphite Mill Wrappers	.35 to	.40
No. 1 Old Kraft	1.20 to	1.30
News—		
No. 1 Wh. News Cuttings	1.50 to	1.65
Strictly Oversize	.60 to	.70
Strictly Folded	.50 to	.60
No. 1 Mixed Paper	.32½ to	.37½

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—		
Lump, cwt.	3.75–	
Ground, cwt.	3.50–	
Powdered, cwt.	3.90–	
Blanc Fixe—		
Pulp, bulk, ton	35.00 to	40.00
Dry, barrels, pound	.0300 to	.0400
Bleaching Powder—		
Drums, cwt.	2.00 to	3.00
Casein (Domestic Standard)—		
20-30 mesh (bags), lb.	12.50 to	13.50
80-100 mesh (bags), lb.	13.50 to	14.50
Argentine, lb.	12.00 to	12.50
China Clay—		
Domestic Filler		
Bulk (mine) ton	8.50 to	15.00
Domestic Coating		
Bulk (mine) ton	12.00 to	22.00
Imported (ship side)		
Bulk (lump) ton	15.00 to	26.00
Chlorine—		
Tank cars (wks) cwt	1.75 to	1.90
Gelatine (silicin), lb.	.85 to	.87
Glyc. (C.P.) drums, lb.	.1250 to	.1300
Litharge, powd., bbl., lb.		.0825–
Rosin (Gum)—		
New York, per 100 lbs.		
E		2.46–
F		2.46–
G		2.46–
WW		2.40–
Rosin (Wood), carlots		1.40–
Salt Cake—		
Dom. bulk (wks) ton	16.00 to	17.00
Imp. bulks on dock—		
(Atl. ports) ton (Nom.)	20.00 to	
Soda Ash—		
Bulk (works), cwt.	.90 to	.95
Paper Bags, cwt.	1.05 to	1.35
Barrels, cwt.	1.05 to	1.35
Soda (Caustic)—Ammonia,		
Solid, drums, cwt.	2.30 –	
Ground and flake, drums, cwt.	2.70 –	
Sodium Silicate—		
60 deg., 55 gal. drums, (works) cwt.	1.65 to	2.00
40 deg., 55 gal. drums, (works) cwt.	.80 to	1.20
Starch—		
Pearl, 140 lb. bags, cwt.	2.95–	
Pearl, barrels, cwt.	3.05–	
Paper (Sp.) bags, cwt.	3.05–	
barrels, cwt.	3.15–	
Sulphur (crude)—		
(mine) bulk, long ton	16.00 to	20.50
Talc—		
Dom. 100 lb. bags (mine) ton	14.00 to	17.25
Imp. bulk, ton (Nom.)	23.00 to	–
Titanium Dioxide—		
Barium Pig., bbls., lb.	.05¾ to	.05¾
Calcium Pig., bbls., lb.	.06 to	.06¾
Zinc Sulphide, bbls., lb.	.07¾ to	.08

CHEMICAL PULP
(Air-dry ton)

	per cwt.	
Soda (Dom.) del'd. mill—		
Bleached, contract	3.20 –	
Open market	3.20 –	
Sulphate (Dom.) f. o. b. mill—		
Bleached	4.00 to	4.25
Kraft No. 1	3.25 to	3.50
Kraft, Southern, del.	3.10 to	3.25
Sulphate (Imp.) on dock—		
Bleached	4.50 to	4.75
Kraft No. 1	3.50 to	3.75
Kraft No. 2	3.25 to	3.50
Sulphite (For.)		
On dock—		
Prime bleached	4.00 to	4.25
Prime easy bleach	3.75 to	4.00
Prime strong unbl.	3.25 to	3.50
Sulphite (Dom.)		
Bleached, contract	3.62½ –	
Bleached, open market	3.62½ –	
Unbleached, contract	3.17½ –	
Unbleached, open market	3.17½ –	

MECHANICAL PULP
(Air-dry ton)

	per ton	
No. 1 Dom. & Can. (f. o. b. pulp mill)	34.00 to	37.00
No. 1 Imp. (On dock)—		
Moist	(nominal) 43.00 to	48.00
Dry	(nominal) 45.00 to	50.00

PAPER
f. o. b. New York City

	per ton	
Boards—		
Binders	73.00 to	80.00
Chip	32.50 to	35.00
Chip, agl. mla. lined	50.00 to	55.00
Coated, white patent		
.016	75.00–	
.020 and heavier	70.00–	
Kraft liner	55.00–	
News	32.50 to	35.00

	per cwt.	
Book (easel)		
No. 1 Glossy Coat	11.50 to	13.50
No. 2 Glossy Coat	10.25 to	11.75
No. 3 Glossy Coat	9.55 to	11.00
No. 4 Glossy Coat	9.15 to	10.50
No. 2 Offset	7.70 to	9.00
A Grade M. F.	6.75 to	7.25
A Grade Super	7.00 to	7.50
B Grade M. F.	6.30 to	6.80
B Grade Super	6.55 to	7.05
B. S. & S. C. Litho	6.80 to	7.30
B. M. F. Litho	6.55 to	7.05
Ivory & India	.50 cwt. extra	

	per cwt.	
Bonds (Rag Content)—		
100% Rag Ext. No. 1	39.10 to	46.00
100% Rag	31.05 to	36.50
85% Rag		
75% Rag	23.80 to	27.75
65% Rag	20.50 to	25.00
50% Rag	17.55 to	21.50
25% Rag	14.65 to	17.75
Regular Colors	1.00 cwt. extra	

	per cwt.	
Bonds (Sulphite)—		
No. 1	8.95 to	11.00
No. 2	8.05 to	9.75
No. 3	7.60 to	9.25
No. 4	7.50 to	9.00
Colors	1.00 cwt. extra	
Glassine (f. o. b. mill)—		
Embossed (25 lb. up)	13.75 to	14.00
Bleached (25 lb. up)	12.75 to	12.87½
Unbleach. (25 lb. up)	11.00 to	11.25
Greaseproof—		
Bleach. (25 lb. up)	10.50 to	10.75
Unbleach. (25 lb. up)	9.50 to	9.75

	per cwt.	
Ledgers (Rag Content)—		
100% Rag Ext. No. 1	40.25 to	47.25
100% Rag	32.30 to	37.75
85% Rag	29.90 to	35.00
75% Rag	24.75 to	29.00
65% Rag	21.65 to	26.25
50% Rag	18.70 to	23.75
25% Rag	15.80 to	19.25
Regular Colors	1.00 cwt. extra	
Ledgers (Sulphite)—		
No. 1	10.10 to	12.25
No. 2	9.25 to	11.25
No. 3	8.80 to	10.75
No. 4	8.50 to	10.25

	per ton	
News—		
Rolls (Contract)	49.00 to	50.00
Rolls (Spot)	(nominal)	
Sheets	58.00 –	

	per ream	
Tissues (Carlots)—		
White, No. 1	.97½ –	
White, No. 2	.75 to	.77½
Anti-Tarnish M. G.	.90 to	1.05
Colored	.87½ to	1.10
Kraft	.85 to	.90
Manila	.77½ to	.80
Napkins, semi-crepe (12¼ lb. to M shts.) per ea	.41 –	
Napkins, full crepe and emb'sed (12¼ lb. to M shts.) per ea.	.43½ –	
Toilet, Bleached (M shts.) per ea	5.80 –	
Toilet, Unbleached (M shts.) per ea	3.50 –	

	per case	
Towels—		
Bleached	3.10 to	3.65
Unbleached	1.95 to	3.30

	per cwt.	
Wrappings (Kraft)—		
Extra Quality	5.25 to	5.75
Super-Standard	4.87½ to	5.25
Northern Standard	4.25 to	4.75
Southern Standard	4.25 to	4.75

Wrappings (Sulphite and Bleached Kraft)—
(Rolls, f. o. b. mill)

	per cwt.	
Bleached papers—		
M.F.& M.G. Waxing, 20 lb. (Carloads only)	6.40 to	6.50
(10,000 lbs.)	6.60 to	6.90
Drug wrapp. 35 lb.	6.00 to	6.25
Unbleached Papers—		
Com. Grd. Butch. 40 lb.	4.50 to	4.75
No. 1 Butchers	5.00 to	5.12½
No. 1 Imit. Parch & Dry Fin.Groc.Sulphite 30 lb.	5.50 to	5.75
No. 2 Imit. Parch & Dry Fin.Groc.Sulphite 30 lb.	5.25 to	5.50
Steam Finish, 50 lb.	4.00 to	4.25
Water Finish, 40 lb.	4.50 to	4.75

	per cwt.	
Manilas—		
Envp. Mla., Sub. 16-40 (No. 1)	5.25 to	5.50
Envp. Mla., Sub. 16-36 (No. 2)	5.00 to	5.25
Envp. Mla. (Prices based on large sheets untrim'd rear-marked, in bdls.)		
Wrapp. Mla. 35 lb. up—		
No. 1	5.25 to	5.50
No. 2	5.00 to	5.25
M. G. Sulphite and Kraft (other than Waxing)		
Grade A-25 lb.	6.00 to	6.12½
Grade B-25 lb.	5.50 to	5.62½